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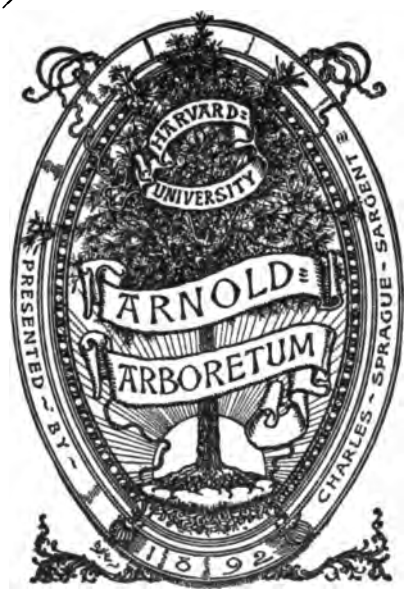

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REPORT

OF THE

FIRST ANNUAL MEETING

OF THE

CANADIAN FORESTRY ASSOCIATION

HELD AT

OTTAWA, MARCH 8, 1900

OTTAWA
GOVERNMENT PRINTING BUREAU
1900

35091

Feb. 2, 1924

OFFICERS.

HONORARY PRESIDENT,

HIS EXCELLENCY THE EARL OF MINTO, GOVERNOR GENERAL.

PRESIDENT,

HON. SIR HENRY JOLY DE LOTBINIERE, K.C.M.G., Minister of Inland Revenue, Ottawa.

VICE-PRESIDENT,

MR. WILLIAM LITTLE, Westmount, P.Q.

VICE-PRESIDENTS FOR THE PROVINCES AND DISTRICTS,

Ontario.—MR. J. B. MCWILLIAMS, Peterborough, Ont.

Quebec.—HON. S. N. PARENT, Commissioner of Crown Lands, Quebec.

New Brunswick.—HON. G. G. KING, Chipman, N.B.

Nova Scotia.—DR. A. H. MACKAY, Superintendent of Education, Halifax, N.S.

Prince Edward Island.—HON. D. FERGUSON, Marshfield, P.E.I.

Manitoba.—MR. STEWART MULVEY, Winnipeg, Man.

Assiniboia.—HON. W. D. PERLEY, Wolseley, Assa.

Saskatchewan.—MR. THOMAS MCKAY, Prince Albert, Saskatchewan.

Alberta.—MR. WILLIAM PEARCE, Calgary, Alberta.

Athabasca.—MR. F. WILSON, Hudson Bay Company, Ft. Vermilion, Athabasca.

British Columbia.—MR. H. BOSTOCK, M.P., Ducks, B.C.

Yukon.—MR. WILLIAM OGILVIE, Commissioner, Dawson, Yukon.

Keewatin.—The Lieutenant-Governor of Manitoba, Winnipeg, Man.

SECRETARY,

MR. E. STEWART, Chief Inspector of Timber and Forestry, Department of the Interior, Ottawa.

ASSISTANT SECRETARY AND TREASURER,

MR. R. H. CAMPBELL, Department of the Interior, Ottawa.

DIRECTORS,

MR. HIRAM ROBINSON, Ottawa.

MR. WM. SAUNDERS, LL.D., F.L.S., F.R.S.C., Director of Experimental Farms, Ottawa.

MR. JOHN MACOUN, F.L.S., F.R.S.C., Assistant Director of the Geological Survey, Ottawa.

MR. THOS. SOUTHWORTH, Director of Forestry, Toronto.

MR. C. JACKSON BOOTH, Ottawa.

HON. G. W. ALLAN, Toronto.

MR. E. W. RATHBUN, Deseronto.

CANADIAN FORESTRY ASSOCIATION

PRELIMINARY PROCEEDINGS

The Minister of the Interior, recognizing the importance of the proper management of the timber wealth of Canada and of encouraging its preservation and restoration, in 1899 appointed Mr. E. Stewart, then of Collingwood, chief inspector of timber and forestry.

In entering upon his duties Mr. Stewart recognized the fact that some organization for arousing and educating an interest in the subject would be of great assistance in carrying out the objects for which his office had been created. In view of the success which had attended the work of the American Forestry Association it was thought that an organization for Canada on similar lines would probably be able to accomplish what was required, and on January 8, 1900, Mr. Stewart sent out notifications to a number of gentlemen interested in timber and forestry, asking them to meet at his office on the 15th of that month for the purpose of considering the matter and deciding what steps should be taken.

At this meeting there were present Sir Henri Joly de Lotbinière, Mr. J. R. Booth, Mr. Jas. A. Smart, Deputy Minister of the Interior; Dr. Wm. Saunders, Mr. Wm Little; Mr. Thos. Southworth, Clerk of Forestry for Ontario; Mr. E. Stewart, Chief Inspector of Timber and Forestry for Canada; Professor Macoun, Assistant Director of Geological Survey; Mr. Wm. Pearce, of Calgary; Mr. T. C. Keefer, C.M.G.; Mr. C. H. Keefer, C.E.; Mr. Mackenzie, of Duck Lake, N.W.T.; Mr. W. T. Macoun, and others.

Mr. Wm. Little was elected chairman, and Mr. E. Stewart secretary.

Mr. Stewart explained the object of the meeting and the steps which had been taken to call it together, and expressed great pleasure at its representative character.

Dr. Saunders gave some account of tree culture at the Experimental Farms. Remarks were also made by Mr. Southworth, Mr. J. R. Booth, who spoke particularly in regard to fire ranging, and by Sir Henri Joly.

It was moved by Mr. Smart and seconded by Professor Macoun, that Sir Henri Joly, Mr. J. R. Booth, Mr. W. Little, Mr. T. Southworth, Professor Saunders and Mr. E. Stewart act as a Committee to call a meeting of all persons interested to be held during the month of February in the City of Ottawa, for the purpose of considering the formation of an Association to promote forestry in Canada, the committee to prepare for submission to the meeting a constitution and by-laws and also a programme consisting of addresses on appropriate subjects for discussion at the meeting. This resolution was carried unanimously.

The meeting then adjourned.

NOTICES

The Second Annual Meeting of the Canadian Forestry Association will be held at Ottawa March 8, 1901. Arrangements for special meetings may be made by the Executive Committee.

All Membership Fees should be forwarded to the Treasurer, Mr. R. H. Campbell, Department of the Interior, Ottawa. The Annual Membership Fee is $1.00 and the Life Membership Fee $10.00.

'Rod and Gun in Canada,' a monthly publication issued by Mr. J. F. Mackay at 603 Craig St., Montreal, has been made the official organ of the Association and the membership fee will include a subscription to that paper. A department relating to Forestry will be regularly conducted therein and it is hoped that the members of the Association will assist in making it as useful and interesting as possible by contributing papers, correspondence or any items of interest. These may be forwarded either to the Secretary or directly to the publisher.

FIRST ANNUAL MEETING

OF THE

CANADIAN FORESTRY ASSOCIATION

Held in the Railway Committee Room of the House of Commons, March 8, 1900.

The meeting convened at 10 o'clock A.M., and Sir Henri Joly de Lotbinière was elected Chairman, Mr. E. Stewart acting as Secretary.

Sir Henri stated that a number of Canadians interested in Forestry had been connected with the American Forestry Association, but that there were very few of them left, and it was considered that it was now time to form an Association for Canada, which could use its influence directly on our own people. He explained the steps which had already been taken, leading up to the appointment of a Committee to prepare a Constitution and By-Laws, which would now be submitted to the meeting.

Continuing, the Chairman said: The objects to be served by the formation of a Forestry Association for Canada may be stated as

First: To advocate and encourage judicious methods in dealing with our forests. During the time I was connected with the American Forestry Association, since 1882, they have been trying to induce the Government to preserve the timber lands on the slopes of the mountains and on the headwaters of the great rivers. They had seen the deplorable effects of the destruction of the forests on the Continent of Europe. Professor Fernow and the members of the Forestry Association saw the danger there was to the prosperity of the country if the forests of the Rocky Mountains were destroyed. I am a witness to what they did in order to induce the American Government to take an interest in this question, and they have succeeded in getting laws passed at Washington to ensure the protection of the forests on the headwaters of their great streams. Hundreds of thousands of dollars have been expended in the States, to purchase large extent of lands only fit for tree culture, and to reafforest them, as in the Adirondacks where we can see the terrible ravages wrought by the blind destruction of the forest. Under our system in Canada we keep the ownership of the lands and license out the cutting of the timber under certain regulations, while in the United States they have sold nearly all their forests, except what Professor Fernow and the American Forestry Association have been able to save.

To appeal to the experience of Canada and the results so well known to our own lumbermen. There was a time when the lumbermen, if they heard of Forestry, would turn away in disgust and consider it only a nuisance, but they have begun to find out that it is quite the reverse: Take the question of fires. There has been more valuable timber destroyed by fire than by the axe of the lumberman.

The lumbermen have found out that it is not only with the wish of holding meetings, which only end in the printing of more or less interesting addresses, that such an Association as this is formed for the protection of forests. We can point to the success obtained in guarding the forest against fire to show how much an Association like this can help to accomplish. We have before us a task most interesting, most productive, and if we carry it out with enthusiasm, such as the subject deserves, it must be of real good to the country.

A second object of the Association is to awaken public interest to the dangers resulting from undue destruction of the timber along the sources of rivers and streams. In the Western States, such as Colorado and Montana, the title of their chief forestry officer is, as I remember it, Chief of Forestry and Irrigation. In the reports of these officers they explain that the purpose in view in planting trees is not so much to procure timber and fuel, as to secure fertility in the regions suffering from drought. The roots of trees, leaves, moss, &c., are like a sponge which holds the rain water and prevents it from rushing down on the fertile valleys and converting them into beds of gravel, as has occurred with such destructive effect in the south of France, Italy, Spain, Greece and other southern countries. Let us preserve the trees and the regular supply of water and moisture necessary for fertilization is preserved.

A third object is to consider and recommend the exploration as far as practicable of our public domain and its division into agricultural, timber and mineral lands with a view to direct immigration and the pursuits of our pioneers into the channels best suited to advance their interests and the public welfare. If there is anything important and that ought to have been done generations ago it is this, and we can still do it with our public domain. We can study our own property to discover what it is fit for, ascertain whether in those parts of the country which nature has supplied with a bountiful crop of trees it is better to remove or to preserve them. When trees are removed we often leave only a barren wilderness. On the other hand there are lands with a rich and productive soil. We ought to discriminate, and not to allow the settler on lands unfit for cultivation. On this side of Lake Superior nearly all the land unfit for agriculture is covered with trees which are of real value, and there are many cases where the trees are much more valuable than any crop, even from the good land. It is necessary to draw the attention of the federal and the provincial authorities to the cruelty of sending settlers where the soil is not fit for cultivation, with the result that, after persevering efforts continued for years to save themselves and the fruits of their labour, they are obliged to move and leave large tracts of wilderness which would have been valuable for timber culture It is noticeable that on lands unfit for agriculture, on sandy soil, we often find fine pine forests.

Another object is to promote forest tree planting in the treeless areas of our north-western prairies, and also along the streets and in the parks of our villages, towns and cities. The western prairies suffer from drought. We know that wind is more dessicating and can absorb as much moisture as the sun. I have been in the North-west in the month of August and could not account for the strange sensation felt until I discovered that it was due to the continual wind, without gusts, but making itself felt as a steady current, like that of a river. By planting belts of trees across our land we will break that steady wind that sucks up the moisture off the soil; there is no doubt that one of the most important things to help the North-west farmer is the planting of trees. Undoubtedly there is a capacity for growing trees in the North-west, though it was denied for a long time. At Moose Jaw, at Medicine Hat, Calgary, &c., trees have been planted by the Canadian Pacific Railway Company and are flourishing, and much has been done in this direction by the Experimental Farms under the direction of Dr. Saunders.

Another proposed object is to collect and disseminate for the benefit of the public information bearing on the forestry problem with respect both to the wooded and prairie districts of Canada. After stating what we will try to accomplish, the next thing will be to spread the information, and in order to do so we will have to ask the members of the association for a small contribution for printing reports.

At the edge of the Pine Woods, near Muskoka Lakes.

We have suggested one dollar as the annual subscription and ten dollars for life membership.

I have explained the purposes of this organization. If you approve of them, if you think it is a work to which you can devote a little of your spare time, which may give you the satisfaction of feeling that you are doing your duty to your country, I hope that we will receive the encouragement which we humbly think that, not ourselves, but the objects we have in view, deserve.

The Chairman then called upon Mr. Stewart to read the constitution and by-laws as prepared by the committee.

Before doing so, Mr. Stewart read a communication from Dr. B. E. Fernow, Director of the New York State College of Forestry, and formerly Chief Forester for the United States, expressing regret that it would be impossible for him to be present, but wishing all success to the association in its efforts.

Mr. Stewart also stated that Mr. Gifford Pinchot, Chief of the Division of Forestry at Washington, who had been extremely kind in furnishing full information to the office here with reference to the regulations and work of his office, had written expressing the hope of being present at the meeting but unfortunately was unable to attend.

Votes of thanks were also passed to the railway companies and to the press for the interest they had shown in the meeting, the railway companies having granted the single fare rate without any guarantee as to numbers and the press having given full notices of the meeting.

Mr. Stewart then explained the steps that had been taken which resulted in the preparation of the constitution and by-laws now to be submitted. For this meeting notices had been sent to senators, members of parliament and all who it was thought might be interested. It was especially desired that all the lumbermen should be present and take an interest in what was being done, and it would be understood that, whether a notification had reached them or not, the desire of those moving in the matter was that every one who wished to do so should feel at liberty to attend the meeting. All the expense so far undertaken had been borne by the Department of the Interior, and the department was ready to assist the association in every way possible.

On motion of Dr. Saunders it was decided to take up the clauses of the constitution and by-laws *seriatim*.

After this business had been proceeded with for some time it was announced that Strathcona's Horse had arrived on Parliament Hill and the meeting was adjourned till twelve o'clock to give those present an opportunity of witnessing the parade and giving expression to their feelings of patriotism.

On reassembling a communication was read by the secretary from Mr. J. F. Mackay, manager of 'Rod and Gun in Canada,' in which it was stated that that publication desired to aid the cause of forestry by adding a department devoted to it, and would be pleased to receive and publish any contribution on that subject from any one interested. Mr. Mackay also stated that if the association desired an official organ he would be pleased to have his journal so designated.

The consideration of the constitution and by-laws was then resumed.

In connection with the clause in regard to membership fee Mr. C. E. E. Ussher asked whether the intention was to provide for a paid secretary as he considered that such an officer would be necessary. In reply the chairman stated that Mr. Stewart had consented to act as secretary and that the Department of the Interior, with which his office was connected, would permit him to devote a large portion of his time to advancing the objects and interests of the association. The annual membership fee in the American Association was $2.00 and the life membership $100.00. Mr. Stewart also stated that he would be pleased to do all in his power to forward the work of the association and that his department had promised to give him large liberty of action. He also stated that the department had already assisted the preliminary work in many ways and had sent a stenographer to take the report of this meeting for the association.

On motion of Professor Macoun it was decided to make the annual membership fee $1.00 and the life membership $25.00 (which was afterwards reduced to $10.00).

After the constitution and by-laws had been considered clause by clause and amended in some particulars, they were passed as a whole in the following form:

CONSTITUTION.

I. The name of the association shall be The Canadian Forestry Association.

II. Its primary objects shall be:—

(1.) To advocate and encourage judicious methods in dealing with our forests and woodlands.

(2.) To awaken public interest to the sad results attending the wholesale destruction of forests (as shown by the experience of older countries) in the deterioration of the climate, diminution of fertility, drying up of rivers and streams, &c., &c.

(3.) To consider and recommend the exploration, as far as practicable, of our public domain and its division into agricultural, timber and mineral lands with a view of directing immigration and the pursuits of our pioneers into channels best suited to advance their interests and the public welfare. With this accomplished a portion of the unappropriated lands of the country could be permanently reserved for the growth of timber.

(4.) To encourage afforestation wherever advisable, and to promote forest tree planting, especially in the treeless areas of our North-western prairies, upon farm lands where the proportion of woodland is too low, upon highways, and in the parks of our villages, towns and cities.

(5.) To collect and disseminate, for the benefit of the public, reports and information bearing on the forestry problem in general and especially with respect both to the wooded and prairie districts of Canada, and to teach the rising generation the value of the forest with the view of enlisting their efforts in its preservation.

MEMBERSHIP.

III. Its members shall include all who pay an annual fee of $1 or a life membership fee of $10.

OFFICERS.

IV. The officers shall include an Honorary President, a President, a Vice-President, a Secretary, an Assistant Secretary, a Treasurer and seven Directors.

V. These officers shall be elected by ballot at the annual meeting of the Association and serve one year or until their successors are elected. Vacancies occurring during the year may be filled by the Executive Commitee.

VI. The officers shall constitute an Executive Committee and five of the same shall be a quorum, and they will appoint a vice-president for each province and for each provisional district of the North-west Territories and also Keewatin.

VII. The annual meeting of the Association shall be on the first Thursday of March, at the City of Ottawa or at such other time and place as the previous annual meeting shall decide, a notice of one month of which shall be given to each member by the Secretary.

VIII. Special meetings shall be held at such times and places as the executive may decide, a sufficient notice of which shall be sent to each member by the Secretary.

IX. Amendments of the constitution can only be adopted by a two-thirds vote of the members present and entitled to vote, and at the annual meeting of the Association, and a notice of such intended amendment shall be given with the notice calling the meeting.

BY-LAWS.

PRESIDENT.

I. The President shall preside at all meetings of the Association.

VICE PRESIDENT.

II. In the absence of the President a Vice President shall preside at all the meetings of the Association; and in the absence of all of them a President *pro tempore* shall be elected by the meeting

SECRETARY AND ASSISTANT SECRETARY.

III. The Secretary shall keep a record of the proceedings of the Association and of the Executive Committee, and shall be custodian of all documents, books and collections ordered to be preserved.

He shall conduct the correspondence of the Association and shall keep a list of members with their residence and shall notify members of the time and place of meeting of the Association, and in his absence his duties will be discharged by the Assistant Secretary.

TREASURER.

IV. The Treasurer shall have the custody of all moneys received and shall deposit or invest the same in such manner as the Executive Committee shall direct and shall not expend any money except under direction or approval of the Executive Committee. The financial year of the Association shall close on December 31, of each year.

ORDER OF BUSINESS.

V. At the regular meeting of the Association the order of business shall be that proposed by the Executive Committee and announced by the presiding officer. In the absence of such prepared order of business the following shall be observed:—

1. Calling to order.
2. Reading of minutes.
3. Reading and referring or disposing of letters, accounts, &c.
4. Reports of Committees.
5. Inquiries and notices of motion.
6. President's address.
7. Papers, addresses and discussion by members and others invited by the meeting.
7. Nomination and election of officers.
9. Unfinished and miscellaneous business.
10. Adjournment.

After the Constitution and By-Laws were passed the Secretary announced that a membership list would be opened and asked those who wished to join the Association to be good enough to sign.

The meeting then adjourned for luncheon.

On resuming at half past two o'clock the Chairman called upon Dr. Bell to read a paper on "Canada's Northern Forests."

Canada's Northern Forests.

By Robert Bell, LL.D., M.D., F.R.S., Geological Survey of Canada.

The subject of the distribution of the forest trees in Canada east of the Rocky Mountains has come particularly under my attention as I have had the opportunity of travelling much during the last forty years including the north country as Government geologist for these regions. The map here (indicating a large map hanging on the wall of the railway committee room) is a copy of one prepared for one of the London universal exhibitions, showing the northern forests and their distribution. This map has been modified somewhat by later investigations and the most recent record is shown by the map which was prepared in connection with a paper I read before the Scottish Geographical Society in 1897.

The forests of North America exhibit a variety and grandeur greater than those of any other country or continent in the world. The reason is supposed to be in part connected with the condition of the earth before the glacial period. It is thought that the polar regions had then a climate fitted for most of our forest trees, which were driven south by the gradual advance of the continental glaciers. After the disappearance of the glacier the trees have been working their way northward. Some of the limits already reached are the extreme possible range; others are not. The trees whose seeds are scattered by the wind, such as the poplar and conifers, will spread more quickly, while others, such as those that have their seeds in the form of nuts, will travel more slowly, the seeds being few in number and being more slowly distributed. A single poplar might scatter seed over a whole county in a single year.

The general verge of the forest is at present moving southward, both in America and on the Continent of Asia-Europe, but still a number of the trees have not yet had time to reach their northern limits. An example of this is the black walnut, whose present north limit is at the head of Lake Ontario, but it is found to grow near Ottawa and also at Quebec. This is one of the trees with which our chairman, Sir Henri Joly de Lotbinière, has been making experiments near Quebec.

The number of species of trees in North America is larger than in any other similar area in the north. There are 340 species between our northern limit and the Gulf of Mexico. The British Islands have only some fourteen species, and over the whole continent of Europe there are only twenty-five or thirty species. In Canada there are about 120 species, 95 occurring east of the Rocky Mountains and 25 west of that range. As the width of the continent diminishes rapidly to the south we must necessarily have a large number of species there, so that in the north we have large forests with a small number of species and in the south a smaller area with a large number of species.

The chief factors in causing a flourishing growth of trees are a suitable climate with a sufficiency of moisture. The variations of the climate in North America admit of a great variety of growth from the conifers in the north to the tropical trees of the Gulf of Mexico in the south.

The northern forests of Canada stretch from Labrador to Alaska, a distance of 3,700 miles, and have an average breadth of 700 miles. Of the trees east of the Rocky Mountains, we have a northern group of 12 species, a central group of 60, a southern of 15, and a western group of 8, making the total of 95 species.

Mount Rae, from head of Sheep River, Foothills of Rocky Mountains.
(By permission of the Deputy Minister of the Interior).

In our North-west Territories we have a great triangular prairie and plain country. In its eastern, or prairie portion, there are clumps and bluffs of poplar, but on the plains only a few trees in the deep valleys of the rivers. This triangular region is about 600 miles in width on the international boundary and its apex is near the west end of great Slave Lake. It is bordered principally with poplar, birch, &c., and in the north there is a considerable proportion of coniferous trees.

In the area of our northern forests we have a region about forty-four times greater than England, which is 59,000 square miles in extent.

From Ottawa to James Bay is about 600 miles and it is about 600 miles further to the northern limit of forests. In Labrador we have an area 1,000 miles wide from east to west by 1,000 miles from north to south, equal to the whole of western Europe mostly covered by timber. On the east side of Hudson's Bay trees grow to latitude 57° North. On the west side of the bay they range to latitude 59° North and continuing north-west in the Mackenzie Basin they reach latitude 68° North, or to beyond the arctic circle.

This sketch of our great forest wealth will show the necessity of some steps being taken to protect and preserve this great inheritance, as well as to ensure the deriving of a proper revenue from this source, and it also shows the necessity for the organization of an association such as the one formed here to-day.

As a result of the climatic conditions the boundaries of some of the trees run in almost parallel lines, although others show great eccentricities. It is not the mean temperature of the year so much as the extremes of heat and cold, proximity to the sea or to the prairie region, former geological conditions, &c., which affect the distribution of the trees.

The white cedar is one of the most peculiar in regard to its limits. The reason why it does not extend further west than the eastern part of Manitoba may be owing to the dryness of the climate. There is, however, a patch on the west side of Lake Winnipeg, near Grand Rapids, which was probably started from seed carried by the Indians. They are fond of lining their canoes with the flat branches of the cedar and seeds may have been carried in this way from the eastern side of the lake. Isolated colonies of other species are probably due to the fact that a footing has been gained here and there in advance of the main body. The white cedar is at its perfection in Gaspé and New Brunswick, occurs but little in Nova Scotia, while there is none in Cape Breton or Newfoundland, yet the present conditions are as favourable in the latter as in the former regions. There are no trees along the eastern edge of the Labrador coast, owing to the biting sea air. The islands off our northern coasts are not wooded and we have two triangular areas called the barren lands, one to the north-west and the other to the north-east of Hudson's Bay, but the greater part of the Dominion is well wooded.

In Ontario and Quebec the presence of certain trees is a pretty good indication of climate, but in the West other factors, such as soil and moisture, affect the problem, and the same species does not always grow under the same conditions. For example, in the south some species will seek the coolest situations and in the north the warmest. The white cedar, balsam, white pine, tamarack, white spruce and white birch choose the coolest places in the southern parts of Ontario, while farther north they seek the warmest.

At one time there was a popular notion that the white pine had a very extensive northern range, but in reality it is comparatively southerly in its distribution, being found only in Ontario and Quebec about as far as the divide between James Bay and the southern slope. North of Lake Superior it has been destroyed by fire and has not had time to reproduce itself. It occurs in Newfoundland but not in very extensive forests.

In our northern or spruce forests a bird's eye view of the country would show a 'patchy' appearance, due to the fact that different areas have been burnt over at different times. The white spruce attains its full growth in about 150 years, and there are second-growth patches of this tree of all sizes and all ages up to 100 years or more, together with some of the old forest.

The origin of forest fires in the more accessible regions is usually due to travellers, explorers, miners or settlers handling fire carelessly. Vast amounts of valuable timber have been destroyed in the past in this way and a great deal is still destroyed by Indians and others leaving fire. But I think that the greatest cause of forest fires in the north is lightning, though there may be other causes. One of the most curious of which I have heard is told of in a tradition of the Indians in regard to a fire many years ago in the Lake Temagami district. They ascribe it to the falling of a hot shooting star—quite a possible reason. Other causes may be the spontaneous combustion of pyrites, &c.

One of the principal reasons for the frequency of fires in the accessible parts of the country is the facility of getting matches. With these, Indians and other travellers are frequently lighting their pipes, making smudges, etc., when they would refrain if they required to strike a light with flint and steel in the old way. Eddy's matches are probably responsible for a geat number of the fires.

I have calculated that about one-third of the country may be considered as *brulé*, that is, under a second growth up to about ten years of age; one-third as intermediate, including trees between ten years of age and upwards; and one-third including trees assuming the character of those of one hundred years or more. As already stated the area of our northern forests may be reckoned as forty-four times as great as that of England. Any one of these 44 parts will produce wood enough to supply the ordinary demands of the present population of Canada, that is, five million people could get what is required for mining, fuel, &c., by taking the timber from a space the size of England and would be able to allow the other 43 equal parts to be in reserve or used for export. Spruce trees grow much more rapidly up to about thirty years than they do afterwards. The addition made between thirty and one hundred years is much slower. The older the tree the slower the increase.

If any proof is wanting of forest fires having occurred in remote times, it is supplied by the post-tertiary deposits, where we find the charred remains of trees. In the Scarboro Heights near Toronto charred wood has been found two or three hundred feet below the surface, and similar evidence has been recorded elsewhere.

We have another proof in the habit of the Banksian pine, which requires fire to facilitate, if not to continue its reproduction. The cones are exceedingly numerous. They curve inward and adhere closely to the branch. They grow in bunches of two, three or four and will remain on the tree till it falls away with old age. Though it may be true that this is not the only way the seeds escape from the cones, it is certainly the principal means. The cones gape immediately after being scorched and the wind blows the seeds far away from the parent trees. This habit may have been developed like other habits supposed to be accounted for by the Darwinian hypothesis.

Since I published this statement some years ago other observers have noticed that sometimes cones of the Banksian pine were opened without forest fires, but I have since observed that such cases are due to the sickly condition of the trees and especially to the trees being young and with immature cones opened by some untoward condition. Cones on large thrifty trees are closed until scorched by fire.

This map is not a commercial timber map but a botanical one. Any tree that has its limits north of a given point extends far south, except the Banksian pine, which is mostly confined to the Dominion of Canada. The trees are at their greatest perfection at the centre of their distribution, both as to latitude and longitude.

Discussion on Dr. Bell's Paper.

By request of Dr. Saunders, Dr. Bell indicated on the map the line of northern distribution of the Silver Leaved Maple (*Acer dasycarpum*) which was shown to be near that of the sugar maple, or generally a little south of the Canadian Pacific Railway line in the Lake Superior region. Dr. Saunders stated that he had found *Acer dasycarpum* as far north and west as Portage la Prairie, where it had probably been planted.

Sir HENRI JOLY—My observations appear to indicate that the white spruce does not grow as fast as Dr. Bell's experience seems to suggest. I have measured thousands of white spruce logs in the neighbourhood of Quebec and have never found an average more favourable than one inch in diameter in five or six years, so that thirty years would only give five or six inches.

Sir Henri Joly exhibited two specimens of white spruce wood to illustrate his remarks. In these there had been an increase of one inch in diameter in seven years.

Dr. SAUNDERS.—In the Maritime Provinces we have found that the white spruce will reach from ten to twelve inches of timber one foot from the ground in ten years. We have many specimens at the Experimental Farm of which measurements have been taken from time to time, but the climate in the Maritime Provinces is much more moist than in Quebec. The rate of growth of white spruce is a very important point as it is required for pulp, and it is important to know in what time we could reproduce a pulpwood crop in Quebec.

Mr. WILLIAM LITTLE.—This question in connection with spruce is an important one, as that tree is required for pulpwood. It must be borne in mind, however, that the timber grown in the woods is the important matter, not a single tree growing in a garden. We have spruce trees of enormous growth in our garden, but they are all very branchy. It would be impossible to get a thirteen or fourteen foot log out of them.

Hon. W. D. PERLEY.—I can remember a field in New Brunswick which was a pasture when I was a boy and living there, but it is now all grown up and covered with spruce bush— this in about fifty years.

Sir WILLIAM HINGSTON.—The fact should not be lost sight of that the spruce has no definite rate of growth, that the growth depends upon the conditions. I have been planting for years three, four, sometimes five hundred spruce, and within a certain area can tell what trees will grow fast and what trees will grow slowly. Those that are well protected will grow the most quickly. Some grow as much in three years as others in twelve years. I would like to ask Dr. Bell whether he thinks that low elevation has much to do with the growth of trees? Is it more a question of high or low elevation than one of latitude? If a high level plain occurs, is there any abrupt change? Also whether there is any change in the umbrageous character of the leaf due to elevation?

DR. BELL.—I consider that elevation has a great deal to do with the growth of trees. When a sudden change in elevation occurs there is an equally sudden cutting off of trees. As we go north the line of perpetual snow moves lower down. In passing from Lake Superior to Hudson's Bay we lose sight of certain trees in crossing the height of land and after descending on the other side the same trees appear again.

DR. SAUNDERS.—Does increase in elevation help the growth of certain trees?

DR. BELL.—Some grow better on high land, for instance the hard maple in the region north of Lake Huron and the Ottawa river.

DR. SAUNDERS.—The reason I asked that question is because I have found on the Riding mountain at an elevation of 1,800 to 1,900 feet *Populus tremuloides* growing to a great height, while on the lower ground it was of much smaller size.

MR. W. T. MACOUN.—Has the white pine been found growing upon swamp land?

DR. BELL.—It grows on swamp land in some places in Western Ontario, notably in the county of Bruce.

DR. SAUNDERS.—How far north does one go before the tamarack changes its character as to choice of ground? I have seen tamarack in wet ground as far north as the Swan River.

DR. BELL.—The change takes place about the height of land. The absence of trees in Manitoba must be due to some inherent difference in climate. The trees do not stop abruptly on reaching Manitoba, but begin to curve southward east of that province.

DR. SAUNDERS.—Why is it that on the southern banks of the rivers in the West the trees are of considerable size, while on the northern bank they are smaller? Is not this due to fire?

DR. BELL.—I have noticed that the east and west banks also show a difference, the one slope having a better growth than the other. I think it is due to the fact that in the spring, being exposed to the sun on the south facing bank, the sap is forced up early and the first severe night frost bursts the bark and destroys the tree.

DR. SAUNDERS.—We have had apple trees killed at the Experimental Farm before they were large enough to run sap.

MR. STEWART.—I was at the meeting of the Manitoba Horticultural Society lately and Mr. Stevenson there showed specimens of Wealthy and Hibernal apples grown at his place in Manitoba. The apples were well formed and matured.

DR. SAUNDERS.—I know Mr. Stevenson's place well and the trees are growing at an elevation of less than 700 feet. There is heavy wood to the north and west, while the orchard is so surrounded by evergreens that it is difficult to find it.

Mr. Thos. Southworth, Director of Forestry for Ontario, was then called upon to read a paper on "Forestry Progress in Ontario."

FORESTRY PROGRESS IN ONTARIO.

By Mr. Thos. Southworth, Director of Forestry for Ontario.

In accepting the invitation to submit a brief statement as to the progress and present status of the movement for scientific forestry methods in Ontario I do so with pleasure for the reason that I consider very satisfactory progress has been made.

I am free to admit we have fallen short of the results hoped for by enthusiastic advocates of a rational forestry system, but it should be borne in mind that it is not so very long since the time when trees were justly regarded as obstacles by the hardy settler in Ontario, as the shelter and lurking place of wild animals and the dangerous aboriginal inhabitants who resented his coming.

The forest was an enemy to be removed to make room for houses and crops of cereals and grasses. It is not to be wondered at if the early settler in Southern Ontario in his warfare against the forest was not satisfied with having conquered but must proceed to exterminate. To such an extent was this war of extermination carried that in some of the older counties of the Province less than five per cent of the total area was left in wood and that so scant and scattering as to scarcely deserve the name of 'forest' in its modern meaning.

The labour of clearing a farm in the early days was very severe. The timber was heavy and as there was no market for it, the logs had to be piled and burned, the only return consisting from the 'potash' produced from the ashes gathered from the burned log heaps. Immense trees of black walnut being just as much in the way and of no more value than swamp ash were got rid of in the same way. As settlement progressed, however, the settler was aided by a gradually increasing market for some of the timber that had to be removed.

Before dealing particularly with the present position of rational forestry in its relation to the lands of the Crown in the Province, I desire to refer very briefly to the historical development of the Crown Timber System, at first of Canada and latterly of Ontario.

During the French occupation of Canada the home Government made no provision for reserving any of the timber except oak suitable for vessels, which in the seigniorial grants was reserved for the King, the question of naval supplies hagvin at that early date become important.

When the British took possession of the colony in 1763 very elaborate instructions were furnished to the first Governor, James Murray, as to his administration of the new acquisition. The first thought of the home Government in relation to the forests of Canada was the necessity of preserving the timber for the same purposes which were regarded as of such paramount importance by the French. They appear to have contemplated a more general and systematic method of accomplishing this object than the mere reservation of the timber in the deeds, as will be seen from the following extracts from Governor Murray's instructions dated December 7, 1763:—

'You are therefore to lay out townships of convenient size and extent in such places as you, in your discretion, shall judge most proper; and it is our will and pleasure, that each township do consist of about 20,000 acres, having, as far as may be, natural boundaries extending up into the country and comprehending a necessary part of the river St. Lawrence where it can be conveniently had.

'And you are also to reserve to us proper quantities of land in each township for the following purposes, viz.: For erecting fortifications and barracks where necessary, or other military or naval services, and more particularly for the growth and production of naval timber if there are any woodlands fit for that purpose.

'And whereas, it has been further represented to us that a great part of the country in the neighbourhood of Lake Champlain and between Lake Champlain and the river St. Lawrence abounds with woods, producing trees fit for masting for our Royal Navy and other useful and necessary timber for our navy constructions, you are therefore expressly directed and required to cause such parts of the said country, or any other within your government that shall appear on survey to abound with such trees and shall be convenient for water carriage, to be reserved to us and to use your utmost endeavour to prevent any waste being committed upon the said tracts by punishing in due course of law any persons who shall cut down or destroy any trees growing thereon, and you are to consider and advise with our council whether some regulation that shall prevent any sawmills whatever from being erected within your government without a license from you or the Commander-in-Chief of our said province for the time being, may not be a means of preventing all waste and destruction in such tracts of land as shall be reserved to us for the purposes aforesaid.'

Twelve years afterwards in 1775, the same views were still entertained by the British authorities. Again the setting apart of pine-bearing lands was enjoined, Guy Carleton, Captain General and Governor-in-Chief of the Province of Quebec and all territories dependent thereon, receiving among other instructions, the following in relation to pine bearing lands:—

'It is our will and pleasure, however, that no grant be made of any lands on which there is any considerable growth of white pine fit for masting for our Royal Navy, and which lie convenient for water carriage, but that you do cause all such lands to be set apart for our use and proper regulations made, and penalties inflicted to prevent trespasses on such tracts, and the cutting down and destroying the trees growing thereon.'

The regulations of the land office at that time contained no approach to a license system nor any arrangement by which the public should receive any return for the privilege of cutting timber on the Crown domain. Licenses to cut timber were granted by the home Government to the contractors for the Royal Dockyards and these men in addition to filling their own contracts issued permits to colonials to do a general commercial business in this line.

The first great impetus to the Canadian timber trade was caused by the home Government imposing an import duty on foreign timber, while the colonial timber was admitted free. This duty reached its highest point in 1813 when the duty was £3 4s. 11d. per load with an additional duty of 3s. 2d. when carried under a foreign flag. In 1821 a duty of 10s. per load was imposed on colonial timber but it still had a protection of 45s. per load.

The first step towards securing a revenue from the Crown forests in Upper Canada was in 1826 when the monopoly enjoyed by the navy contractors was abo-

lished and anyone was at liberty to cut timber on the ungranted lands of the Ottawa country on payment of a fixed scale of rate to the Crown. In the proclamation of Sir Peregrine Maitland, Lieut.-Governor of Upper Canada, this change was announced. This proclamation is of great historic interest in several particulars. In addition to imposing a rate of timber dues it provided that these dues should be higher in cases where the timber cut would not square more than eight inches.

The Crown Timber Act of 1849 marks the next important departure and is the basis of the present act. This Act laid down the principle, and it has not been departed from, that a license to cut timber should be issued for one year only, and that in case of renewal the regulations governing cutting might be changed by the government at any time.

The regulations based upon the Act exacted a ground rent of 2s. 6d. per square mile with the provision that if the limit was not worked the ground rent should be doubled. The limit was considered occupied if 500 feet of square timber or 100 saw logs per mile was cut. No charge was made for limits except in the case of two or more parties applying for the same limit, when the commissioner was authorized to award it to the highest bidder at auction.

The auction system was afterwards adopted in all cases of new limits and a fair idea of the increase in value of timber limits may be gained from the fact that at the sale held in 1892 as much as $17,500 per mile was paid for a limit and that for the pine timber only.

The policy adopted then, and since followed, was to secure for the public revenue as much as possible of the value of the merchantable timber before disposing of the land to the individual settler, and it was a fortunate thing for this country that the land was thus held by the Crown for settlement instead of being sold at a nominal price to the lumberman as was done in the United States and in our own country to a limited extent in the early days.

This policy of disposing of the virgin crop of timber for the benefit of the public and then handing the land over to the settler was all right in the case of good agricultural land, but in time it became apparent that we had extensive areas of land unsuited for general farming, land on which timber formed the most profitable crop that could be grown and in the case of this land our timber and land policy did not prove the most suitable. Aside from its uselessness as farming land the great area of non-agricultural land contains the head waters or sources of all our principal streams and for this reason also should be kept in timber.

Our system of timber licenses has not proven all that could be desired for that part of the Crown lands referred to. Although a timber license is issued only for one year it has been customary to renew it from year to year so long as the licensee desired or until the land was settled. Considerable territory has been under license in Ontario for forty years and over and although the Crown Timber Act only provides for a one year license, continued renewals with the yearly payment of ground rent has led the limit owner to believe he has a vested interest in the property, and to regard his year's license as forming, if not a perpetual, at least an indefinite tenure of the land.

The forest fires that a few years ago almost invariably followed lumbering operations, left large blocks of land denuded of timber and otherwise useless. For a long time it was regarded as beyond doubt that when once the virgin forest was cut away there would be no more white pine, that a forest of white birch, poplar, balsam, and other less valuable trees took its place.

Because of this belief reforestation and tree planting were regarded as synonymous terms. An investigation ordered by the Commissioner of Crown Lands in 1891 convinced the Government that planting these burned areas was impracticable because of the great expense. Further investigation during the past few years, however, has proved the erroneous nature of the former belief, and we know now that in all the eastern part of the province a new crop of white pine is growing on the land from which the original one was removed, and it only requires immunity from fire to secure as large or a larger crop than the original one.

After a forest fire the ground appears to be first occupied with a close growth of poplar, birch, &c, whose light winged seeds give them an advantage, but these are followed in a year or two by pine and spruce that come up in the shade of the deciduous trees, the shade of which clears off the lower limbs of the conifers making the tall clean trunks necessary for timber.

Very few forest fires are so severe as to completely remove all the pine trees capable of bearing seed; there are generally a few trees left here and there, and these in due time seem to seed the burned-over areas. While pines do not yield seed oftener than once in three years, seldom so often, in this regard also the deciduous trees have the advantage.

When this condition became apparent to the Government and the question of future timber supplies was seen to be dependent on protection from fire and settlement of the non-tillable areas, an act was passed authorizing the Government to set aside such areas as permanent forest reserves.

A start has been made on our system of reserves. We have created two small reserves containing about 125,000 acres of cut-over lands, and one of two millions about Lake Temagami containing a very large quantity of pine, and where the lumberman has not yet operated.

In the establishment of forest reserves the weak point in our Crown timber system has become apparent. The land that has been burned over and is still unsettled is for the most part unsuited for tillage and should be placed in forest reserves for the growing of timber for revenue and climatic reasons. The owners of timber limits, however, are anxious to retain these areas in their licenses and the Government has not seen fit so far to cancel them.

Although the amount paid in advance by way of bonus for these limits was based upon the timber standing upon them at the time of sale and no account of subsequent growth was taken yet the lumbermen regard them as an asset. These areas could of course remain under license and still be placed in reserves, but as the province would have to go to considerable extra expense in protecting and caring for them it is felt that the public revenue from future cuttings should be greater than the $1.25 per 1,000 now charged on timber cut under licenses. Just what arrangements will be finally arrived at in this particular I am not prepared to say, but it is altogether probable that in the near future Ontario's permanent forests will be increased by many millions of acres.

It is perhaps unnecessary for me to say that the timber on these reserves when mature will be cut under scientific forestry methods. I may also state that the timber on the Temagami Reserve, where the original crop still stands, is not likely to be sold as has been the case on other territory, but after the European system, so far as our circumstances will allow. It was last year patrolled during the summer months by fire rangers, and the number of rangers will be increased this year.

In this connection it may be mentioned that the system of fire ranging adopted in Ontario some few years ago has saved many millions of feet of timber from the flames, and we now feel reasonably safe from large forest fires. Without the presence of fire rangers in the woods during the dangerous months of the year our system of forest reserves would be impossible. The system is about to be extended, and I am of the opinion that it can be made much more effective by being brought more under the direct control of the Commissioner of Crown Lands than it is at present. As Mr. J. R. Booth remarked not long ago, one forest fire occurs now where there were ten a few years ago.

In the other department of forestry in Ontario, what I might call farm forestry, not as satisfactory progress has been made, although the area of wood land in older Ontario is not decreasing at the present time. It is quite true that we are suffering because our lands have been cleared too closely, but it is also true that a great many of our farmers now appreciate the fact, although they have not, except in a few cases, applied the remedy by planting young trees.

Many of the correspondents of the Bureau of Industries in reporting on the fall wheat for the past year, call attention to the fact that where the field was protected

by trees on the north and west, preventing the snow from blowing into drifts, the wheat was a good crop, but where not so protected it was a failure. An increasing number of farmers are planting windbreaks for this purpose, but very few are planting trees in mass.

Nursery grown trees are expensive, and the trees usually taken from the forest and transplanted do not succeed. It is difficult to convince most farmers that very small seedling trees are better to plant than saplings. Just what steps the Government will take to induce the planting of trees on farm lands is not yet decided upon.

Government nurseries as in New Zealand have been suggested, and also remission of taxes in the case of wooded lands. I fully expect that the Ontario Bureau of Forestry will be greatly aided in solving the problem by the deliberations of this Association.

Mr. SOUTHWORTH.—There is one question I would like to ask Dr. Bell. What evidence is there of forest fires having been produced by lightning? I have seen trees struck by lightning, but the fire did not usually spread beyond the tree which was struck, being generally extinguished by the rain which followed.

Dr. BELL.—I witnessed one case myself of a fire caused by lightning and have had many cases reported to me by the Indians, Hudson Bay Company's men and others. The cases of fires caused by lightning in settled districts also corroborate the probability of their being so caused in the north. The rain does not always accompany lightning, nor is it always sufficient to put out the fire.

Mr. M. J. BUTLER.—One point I would like to advert to is the manner in which the provinces treat the forests by allowing lands totally unfit for settlement to be occupied by settlers. In some cases there will be only about twelve or fifteen acres of good land on a farm. The settlers often go in for the sole purpose of taking off the timber.

In the investigations in connection with the Ontario Forestry Commission, we found that the growth of spruce in Hastings, Peterborough, north of Lake Nipissing, Algoma, on the height of land, and at the Rainy River, was an average of about one inch of timber in five years. The Banksian Pine was found to be a quicker growing tree. The sections from which the calculations were made were taken three or four feet above the ground.

Mr. W. T. MACOUN.—The white spruce is probably the slowest growing tree in our forest. I do not think it makes a growth of more than one-fourth of an inch in diameter in a year. The white pine makes about twice as much. In height the growth is about two feet every year. We have at the Experimental Farm white pines planted in 1889, which were then fifteen inches high, and have now attained a height of twenty feet. The Scotch pine is a tree that may prove very useful. It will succeed on any kind of soil, wet or dry. It makes more rapid growth on the same soil than the white spruce. Its growth is about the same as the white pine.

Mr. Halliday, of the Crown Lands Department, Quebec, expressed on behalf of the Commissioner and Deputy Commissioner their regret at being unable to be present.

The chairman then called upon Professor Macoun to read a paper on 'The Deforestation and Reforestation of the Western Prairies.'

THE DEFORESTATION AND REFORESTATION OF THE WESTERN PRAIRIES.

Professor John Macoun, F.L.S., F.R.S.C., Assistant Director and Botanist, Geological Survey of Canada.

I wish to make some statements with which some of you gentlemen may not agree, but I know of what I am speaking and am prepared to support my views,

Avenue of Manitoba Maples *(Negundo Aceroides)*—Experimental Farm, Indian Head.
(By permission of Dr. Saunders).

and I hope those who may be of a contrary opinion will put forward their view of any questions that may be discussed.

There are a diversity of causes for prairie fires. The time was when a large part of Manitoba was covered with forest, and also immense tracts of Eastern Assiniboia. In fact south of Indian Head, less than forty years ago, there was considerable growth. In places where now there are no trees and where settlers say that trees will not grow, forty years ago they were covered with forests.

I want to corroborate a statement of Dr. Bell's. I saw two prairie fires in 1894 at Crane Lake, caused by lightning. If prairie fires are caused by lightning, Dr. Bell is probably right in saying that forest fires to the north of the prairies are so caused. I have seen three or four thunderstorms succeed one another on the prairie without any rain.

I was on the prairie before the settlers. I had the privilege of exploring in the year 1879 for 2,500 measured miles on the prairie, travelling with carts, and in 1880 between 1,800 and 1,900 miles. At that time the prairie was covered with grass in places and in other places there were many tracts of burnt forest, especially on the edge of what is the prairie now. Beyond Last Mountain before you reach Long Lake we came to the edge of the prairie and we got no more wood for two weeks. But I want to call your attention to one thing we noticed. Coming up from the prairie, south of where Humboldt is now, we saw the first willow bush with a pond in front. What did this mean? It meant that when the prairie fire went around the pond it left a small triangular piece unburned. This was food for thought and further observation. After this I went into the Touchwood Hills, and found they were merely a slightly elevated tract broken up by ponds of water.

On my return to Ottawa, I went to Captain Deville, who had surveyed the 'hills' that year and said, 'The Touchwood Hills have no existence.' What did I mean? They were wooded, while the rest of the country was bare, so that they had an appearace of height which really did not exist. Why was this so? Because in front of the hills a continuous series of ponds of water was found. When the fires came to the ponds they ceased. The whole country was wooded and we called it 'hills.'

At Moose Mountain I found a whole series of ponds on the north side of Moose Mountain that it was impossible to fire. The mountain was a tract of land covered by wood. In later years these ponds have dried up, and the fires have gone in.

In the country south of Battleford all the fires came from the south or southwest. I found that, as the fire came up, the growth on the south or west slope was burnt off, but the north face was heavily wooded. If cold was the cause why should this be the case? The real explanation is that the fires burnt to where it was moist and then stopped. Next year they pushed farther and farther on until from latitude 51° to latitude 54° the land is largely burnt over and the forest either gone or very ragged. It is burned in the same way north of the Saskatchewan, and so with the woods in the Peace River Valley, which I examined in 1872 and 1875.

There are tracts that never produced wood. Wherever alkali is found in the soil the trees do not grow. This alkali is not potash, derived from the ashes of fires, but is derived from gypsiferous rock.

The saline lands are not suited for timber. When I was travelling in autumn the half-breeds would go to a pond and try the water by tasting it. But I would send them directly to one which I knew contained fresh water. How did I know? I found that in the spring of the year, when the ponds were filled, nearly all except the salt lakes, were fresh. The pond has an impervious bottom and in the fall of the year it begins to be salt. In the latter part of August and September the sedges, which remain fresh in the fresh water ponds, lose vigour and change colour where the water is saline. Men who have thought much will make trivial things mean much for them.

How do we get humidity? What is the benefit of a forest? What is the difference between a country covered with grass and a country covered with forest?

A tree turns out thousands of leaves and has great roots far down in the ground, and the sun is pumping water out of the tree all day long. It is pumping water out

of the depths of the soil and that water for hundreds of square miles in passing into the atmosphere. The cutting off of the forests means that the rainfall will be carried off the soil too quickly and this return to the atmosphere will cease. The atmospheric currents are not interfered with, but are only prevented from taking the humidity out of the soil through the agency of trees. Thus you have the climate suited to the growing of cereals. The humidity received into the air compensates for the want of it in the climate.

In the sub-arctic forest the trees are spruce, white and black; one pine, the Banksian; one balsam, *Abies balsamea*; two poplars, *tremuloides* and the balsam poplar; and tamarack. The north country produces these and no others.

Of the elm tree, which does not grow on the prairie, there is a magnificent specimen occurring fourteen miles north of Regina in the vally of the Qu'Appelle. The elm is a river-bottom tree.

The oak extends from the Maritime Provinces up on to the prairie at Fort Ellice.

The red ash occurs to half way across Assiniboia at the Dirt Hills, four hundred miles west of Winnipeg.

In 1879 the country up to Moosejaw had a sufficient rainfall for the growth of cereals. In all that country there should be no difficulty in re-covering the greater part with a forest of poplar and possibly white spruce. I eliminate the cold and the Chinooks altogether.

Let us consider now the main prairie including the country four hundred miles from Moosejaw to Calgary. Mr. Pearce has solved the problem of tree growing at Calgary and will tell you what he has done. I saw Mr. Pearce's place before he planted trees and can tell how successful he has been.

My report of 1880 showed that this district was not a desert. Where there is a sward there is no desert. How are the trees to be got on? Precisely in the way that they were taken off. I say that cold has nothing to do with the want of success in growing trees, it is the want of water and water only. Two years ago, when I was in the west, a gentleman now deceased, but then Mayor of Calgary, said to me, 'The Chinooks prevent the growth of trees.' I called his attention to a large tree in the valley of the Bow River. I asked why one was killed while another was left. The reason was that one had water and the other had not. When the trees are planted on the prairie and given plenty of water, as has been demonstrated by the success of the efforts of the Canadian Pacific Railway Company at Moosejaw and Medicine Hat, they will grow and thrive. If it can be done in one place it can be done in another.

When at Indian Head in 1891, I saw a dam built over a creek, and, when asked to speak at a gathering in the evening, I told the people that I would like to see them raise a statue to the man who built that dam. There is a dam also at the Experimental Farm at Indian Head, and the trees growing there are proof of the success of a water supply.

In the prairie region west of Moosejaw there should be dams put across the creeks and some spruce and some poplar put in the beds and valleys, and you can then extend indefinitely. These are conditions that exist wherever there are trees. The trees grow in all the hollows. There must be a snow-catcher and the trees will grow.

The trees must be grown from seed. You take up a tree and cut the tap root and set it down in another place and the drought gets below the root. The almost inevitable result is that the tree withers and dies.

In 1880 we reached Stinking Lake, and north towards the Saskatchewan in some sandhills we discovered twenty-three big poplar trees, none less than one foot in diameter, and not a shrub around them. The conclusion I reached in regard to them was that the sandhills received the water from the air and the trees stayed where the water was, and the fire could not get at them. That satisfied me that neither Chinooks or cold had to do with the matter.

The Cypress Hills have many perennial streams and these should be dammed and the water utilized. A dam at Cypress Lake should be built in order to make use of the water coming out of the Cypress Hills on the south side.

Did time permit, I might say much more on this important subject.

Mr. William Pearce, of Calgary, then read a paper on 'Tree Culture on the Plains.'

TREE CULTURE ON THE PLAINS.

By Mr. William Pearce, Calgary, Alberta.

Some few years ago when political gossip indicated that the Hon. Sir Henri Joly de Lotbinière, the honoured convener of this meeting, would probably be appointed Lieutenant Governor of the North-west Territories, the writer of this, together with all others interested in Forestry in the Territories, breathed a fervent wish that rumour would prove reality, believing his occupancy of that position would do very much more to advance the promotion of that branch of science than could be done by any means then in sight; and although our desires were in that instance met with disappointment, I on behalf of everyone interested in Forestry, at least within that portion of the Territories which may be truly termed the treeless area, desire to tender our hearty thanks for the great interest he, together with the other worthy members of the Committee, has taken in the movement in aid of which we have this day met.

It will probably be admitted by all who have given thought to the subject that it is particularly fitting that those who are interested in or in any way represent our treeless areas should take a prominent part in extending thanks for the efforts already made and anticipate confidently the results hoped to accrue from the organization this day attempted, believing, as they most certainly do, that there is no problem of public policy, which if successfully solved would yield richer returns than the foresting of the great treeless portions of the Western plains. Those situated in the areas specially alluded to, concur in this sentiment. No great effort, skill or study is required to reforest those regions once bountifully covered with trees by nature. But the task to create forests where nature has never done so, may, and no doubt does, appear to many as almost an impossibility, except at a cost of time, money and energy that might cause it to be practically prohibitive. Many of us, however, believe the problem capable of successful solution and are rejoiced in the co-operation of this meeting which we trust and believe will undoubtedly lead to a happy and speedy solution of the problem.

On this occasion it is probably better to treat generally on the subject though I would be only too glad to reply to any questions that may be desired, which I may be able to answer, arising out of a considerable personal attempt at tree growing extending over the past twelve years on the treeless plains and a fairly close observation extending over more than twenty.

There are, however, a few points which it might be desirable to emphasize in regard to the forestation of the treeless plains. It cannot be economically and therefore practically done when any portion of the water required for the plant or tree has to be pumped by hand, horse or steam power.

Outside of the parcels hereinafter mentioned it will prove impossible to make trees grow without the artificial application of water. In many years thorough and deep cultivation would be sufficient to produce a fair growth, if coupled with snow fences, thereby concentrating the snow of several acres on one; but there are winters when there is little or no snow and no drifting, and when that is liable to be

followed by a dry summer then the trees must perish. There is usually no material rainfall in spring or autumn. Sixty per cent of the precipitation occurs between May 20 and August 15. Of the balance fully fifty per cent of it cannot be economically saved except by storage works and afterwards applied under irrigation. From the best information readily attainable, taking Calgary, Gleichen, Medicine Hat and Maple Creek as representative of the treeless belt, from the years 1883 to 1894 inclusive the average rainfall of the four points was 11¼ inches. Sixty per cent of that equals 6⅞ inches, and if of the balance, 4⅜ inches, only one-half can be utilized, then one can rely only on nine inches of moisture obtained throughout the entire year, far from sufficint for tree cultivation.

There may be many situations where water could be economically applied by water or wind power. Nature has been bountiful in its supply of the latter at every point, and at very many in regard to the former. At the same time it is a mistake to suppose that the area embraced within the treeless plain is or need necessarily be devoid of timber. There are very considerable areas scattered all through the region, where, from the surface of the ground water, or moisture therefrom, arising within such a distance from the land surface that the roots of trees can reach it, or from physical conditions, accumulations of snow and reasonable shade, the ground is sufficiently moist to grow trees, and their growth will more rapidly extend than many imagine. The localities mentioned are widely distributed over the region under discussion. If these were all utilized there is no portion of the territories which need be more than ten miles from a sheltering grove and sixty per cent of it not more than one-fourth that distance. The areas so occupied or reserved, in place of in the slightest affecting injuriously any interest at present existent or likely to be, on the contrary would greatly enhance the same. One of the greatest benefits to the public interest would be the setting apart for the purpose indicated of all those parcels so favourably situated, and the sooner it is done the less conflict will there be with private interests as opposed to the public weal.

Irrigation as a Factor in Forestry.

It would never do for one of the irrigation cranks of the Territories to permit an occasion of this nature to pass without directing attention to the value of irrigation to the objects to be promoted by this meeting. It is probably not necessary to more than allude to it on the present occasion. Those who have ever seen an irrigated area, and one that requires irrigation is usually treeless, know that irrigation is invariably followed by timber belts.

Prairie Fires.

Though bush fires have done incalculable damage to Canada, prairie fires have and continue to do also an appalling amount of injury. Public attention has not been particularly directed to this point, because the immediate private loss has not been large and few have looked into the matter and formed an estimate of what the condition of the country would be in a very few years if such fires were a thing of the past. That they can be largely, if not wholly prevented, and that without considerable cost, is true. If this society can lend its aid in this respect it would be productive of incalculable public profit. Forestry and fire protection must go hand in hand. The latter might be carried into effect without paying any attention to the former, though the former would be greatly assisted by giving effect to the latter; but the former cannot be given effect to without the latter.

Protection of Timber in the Foot-hills and Western Slopes of the Rocky Mountains.

The extensive and disastrous high water in Central Alberta in June, 1897, and in Northern Alberta in August, 1899, is wholly attributable to the destruction of

Lake Louise Forest Park Reserve, near Laggan, B.C.

the timber of the foot-hills and eastern slopes of the Rocky Mountains. Unless there is to be a repetition of this, each one probably more disastrous than the preceding, steps must be taken to prevent further destruction and also to re-forest very considerable areas. Such can be cheaply done.

Timber to Grow.

Until wind belts are created let all energies be concentrated on the growth of the native woods, and when that is accomplished then attempt the growth of such as are desired. The shorter distance trees are transported for planting out, and so done at the proper or most advantageous age, the greater will be the success attending the efforts. On this particular point there is no doubt.

Chinook Winds.

Before quitting this subject it may be well to direct attention to an obstacle experienced in the south-west portion of the Territories, viz.: the Chinook winds. The native tree has fitted itself so as to successfully meet and overcome the conditions created by the phenomenally hot winds. Wind belts will protect from the effects of such winds trees which without such would most certainly be destroyed.

Re-forestation as a Commercial Venture.

It is apparent that the more rapidly trees can be grown sufficiently large to be ready for market, the more profitable the venture; of course bearing in mind the value at the place of growth. Soil, climate, rainfall and drainage must be of course taken also into consideration in determining the locations in which such experiments are attempted. On this point it might be well to direct attention to a large portion of the Selkirk Mountain Range, the lower Fraser River, and many points on the Pacific coast and islands in that vicinity. A very large percentage of the areas specified is not of value for ordinary agricultural purposes; but would probably prove highly valuable for the purpose mentioned. Anyone familiar with nature's work in the re-forestation, which, unaided, in fact to some extent greatly opposed, is being carried out along the Canadian Pacific Railway across the Selkirks and along the lower Fraser cannot but be strongly impressed with the favourable conditions which there present themselves.

Marshes and Swamps.

Can anything profitably be done to render our large marshes and swamps valuable for timber production? The growth at present thereon is of little or no value. Would not drainage render many of them highly productive for timber growth and could not many of them by so doing be rendered profitable for that purpose? When of course the depth of soil is slight or has too great a depth of turf, drainage probably would not effect the object desired.

The Beaver an Aid to Protection and Production of Timber.

A friend of mine who has devoted a good deal of study to the production and preservation of forests has asserted it would be a first class economic step to prohibit throughout the whole of Canada the destruction of this industrious animal. This could be readily and cheaply investigated and it is probable his conclusions will be found most sound and an effort should without loss of time be made to establish or disprove the same.

At this stage in the growth of the Canadian Forestry Association it occurred to the writer that a brief allusion to the various heads and branches of the subject would best meet the end desired. Each topic is worthy of a paper of considerable length. At present the aim probably should be to create a general interest, believing if such can be brought into being a hearty co-operation will be created and the end desired the more speedily attained. As one who should be fairly familiar with the conditions and requirements of the West I would close this by expressing the confident hope that this effort will receive the hearty endorsement and co-operation of all Canadians, particularly those resident or interested West of Lake Superior.

Mr. C. E. E. Usher, General Passenger Agent of the Canadian Pacific Railway, stated that he came to the meeting rather as a listener than with the object of making any remarks, but he wished to express his interest in the subject of Forestry and appreciation of its importance.

Mr. Stewart read a paper on "Forestry in the North-west," prepared by Mr. Archibald Mitchell, of Macleod, Alberta, who had been Forester for Lord Dunraven and the Earl of Roseberry in the old country.

FORESTRY IN THE NORTH-WEST.

By Mr. Archibald Mitchell, Macleod, Alberta.

I do not think it will be at all necessary for me at this time, to touch upon the principles upon which the future forest system of Canada ought to be based. In the face of such a committee, formed for such a purpose, I feel that anything I could say in that connection would be altogether unnecessary and uncalled for.

Upon the existing forests of Canada, then, I will say little, beyond expressing the hope that a thoroughly sound system of forest economy will very shortly be established.

It seems to me that the people of Canada are suffering from a lack of information on this subject. If it only could be placed before them, laying due emphasis upon the necessity for such a system, together with the general principles on which it will be based; I believe we should very soon have it in full working order. Canadians are a business people, and a system founded upon a solid business basis could not but appeal to them and win their approbation.

This association, I have no doubt, will speedily accomplish the object for which it has been constituted and Canada will, in a very little while, be in possession of a forest system which will be a splendid monument to posterity of Canadian intelligence and business enterprise.

With regard to the needs of the West, however, perhaps I may be allowed to say a few words, and more particularly with regard to the grazing regions of Southern Alberta and Assiniboia. These regions, it is superfluous to mention, form a magnificent stock feeding area, and the prairies in summer are covered with thousands of cattle and horses. I say summer, advisedly, because, in winter or at least whenever rough and cold weather is experienced, the stock seek the shelter of the river bottoms. They get among the willows there, and congregate in great numbers. Food, naturally, soon gets very scarce, and the animals become quite poor in condition; and in prolonged, severe weather many of the weaker ones die. There is abundance of feed out on the prairie, but the rigour of the climate prevents its being used. When a Chinook wind occurs and the snow is swept off the grass, the cattle will very often refuse to leave the brush, because of the cold north wind, or when they do leave

it, they do not get far into the good grass before another storm compels them once more to return to shelter.

Now, if there were groups of trees, says, about 30 to 40 acres in extent, planted all over the prairie a few miles apart, all this would be avoided. The cattle would have shelter close beside their feeding gounds, they would never lose in condition, and much pecuniary loss to their owners would be avoided.

Every rancher in this country well knows how much such plantations would add to the value of his stock, but the scheme is one which is too large for private enterprise to overtake. Very few ranchers, indeed, have succeeded in raising even a shelter belt around their houses. As a rule they do not know how to set about raising a plantation, and they have little or no time to experiment. Their business is stock raising, and they attend to that.

It is a scheme for the government to undertake, and as a branch of creative Forestry is well worthy the attention of this association. Perhaps the already organized machinery of the Experimental Farms would be best able to cope with it, and at any rate, their experience would be of the greatest value in furnishing data upon which to select plants, &c.

And now, a few words with regard to the practical side of the question. The trees planted, would consist of pines (chiefly Black Austrian), spruces and the hardwoods suitable for the North West.

They would be planted in groups of each sort, say an area of not less than one hundred yards diameter to each group, or, perhaps, the whole of a plantation could consist of one kind of tree. The plants would require to be from two to three feet apart, certainly not more than three conifers would be planted when they were about three years old, that is, two years in the seed bed, and one year transplanted. Hardwoods could be planted as seedlings, but would, in many cases, be better as one year seedlings and one year transplants.

The smaller the plants, the greater the proportion of roots and the easier they are handled. There is less risk of their being injured in the lifting. They are less easily blown out of the ground, as their tops are close to the surface, and besides, are much more flexible; and there is always, at least on the flat, a stratum of air about one foot from the ground which is calmer in a storm than the air above it.

The seedling plants would be raised in a situation convenient for such a purpose, and central to at least ten or twelve of the proposed plantations. All the areas to be planted would be ploughed and cropped with oats or other grain. These crops would serve to ameliorate and loosen the surface soil for the later operations, besides providing somewhat to help cover the expenses. After the lifting of the crop, and during the fall, all the plantation grounds would require to be trench ploughed about eighteen inches deep, and left rough over winter. This would loosen the soil for the plants and help to catch and retain moisture for the growing season. This is a most important consideration in Southern Alberta, for the frequent Chinooks melt the snow which simply runs off the surface and by and by finds its way to the rivers and lakes, because the frozen ground will not allow it to penetrate into the soil. The rough broken land just left by the plough would help to collect this water and hold it till spring when it would be able to soak away.

In the meantime the plants for each area would have been transplanted into lines in the area they were to ultimately occupy. Another crop of grain would be taken off the trenched land, and the plants would be *slipped* in on the stubble in the spring following.

The plants, being already on the ground, much danger from drought during planting would be avoided. The ground being comparatively level and held by the stubble, there would be less risk of the plants being buried in dust, a condition of affairs which must be reckoned with in this country.

There would be little danger of the cattle damaging the plants, as in summer they would not touch them, and in winter, when the grass was under snow, the trees, at first at any rate, would be under the snow also. By and by, when they got above the snow, they would be of size enough to recover any little damage that might be incurred.

Once established, growth would be most rapid. In about fifteen years the plantations would be at least as many feet high.

The drifting snow would be caught by the trees and remain there to gradually melt with the heat of spring. The ground, being then soft, a plentiful supply of moisture would sink into the soil for the use of the trees.

The falling needles and forest mosses would soon absorb and retain large quantities of water. The surplus would run off and help to vivify the grass of the prairie all round the plantations. In fact, it would just be on a great scale what is to be seen in every coulee and scrub patch in the country, the snow would be retained till the ground was soft enough to absorb it. This indeed seems to be the trouble with the so-called semi-arid regions of southern Alberta and Assiniboia. Plenty of moisture falls in the form of snow, but the Chinooks melt it while the ground is frozen. It cannot enter the soil and so it finds its way at last to the rivers, or lies in shallow pools on the surface to be dried up by the first few days of real warm weather.

And another effect the afforestation would also probably bring about. Forests, as is well known, collect moisture from the air, and many additional springs would probably be formed around the woods, a matter of considerable importance, when perhaps for miles no water is available for the cattle except may be a small alkali-impregnated lake.

And yet another benign effect might result. The retention and subsequent gradual evaporation of increased quantities of water in the district would cause an increase of moisture in the atmosphere, and possibly also an increased rainfall as a result of that; and who can estimate the value of such a blessing to the sun-baked plains of the west. Even this alone would warrant the adoption of this, or some other such scheme as I have here indicated. The experiment, if conducted on a sufficiently comprehensive scale would be a magnificent one, and its execution would be well worthy of the intelligence and enterprise of the people of Canada.

It is not, of course, intended that this paper should indicate in any arbitrary fashion the course to be followed in this matter. It is simply intended to draw attention to what is felt to be a real need in the country, and to point out briefly the general lines on which it may be met. Some such scheme will be of infinite benefit, and in the coming Forest Department of Canada the partial afforestation of this section of the North-west in something akin to the manner indicated will deserve a most worthy place.

Dr. SAUNDERS.—The results of our experiments with the Austrian pine at the Experimental Farms show that there has been no success with them in the West, nor have the hardwoods been successful. The native trees are most satisfactory, especially the Manitoba maple. At the Indian Head Farm we have 120,000 trees, 110,000 of the native maple and the others chiefly elm and ash. They must be grown from seed ripened in that country, or from seed from the trees found occasionally in the district.

Mr. PEARCE.—The results of my experiments with the pine were very good, but the Manitoba maple was not found satisfactory where there were Chinook winds.

Mr. Little read a communication from Mr. Stewart Mulvey, of Winnipeg, regretting his inability to be present but expressing his pleasure at the prospect of the formation of a Canadian Forestry Association, which he considered of great importance to the West.

The CHAIRMAN.—I hope that the success of the present meeting will be repeated in our future meetings and that we may have as interesting and useful papers. I trust also that it may be possible to arrange for an evening session. I cannot help saying, and I am sure we will all agree on that point, that we have obtained a great deal of information which will be turned to account and such as we will be able to embody in our report.

Moved by Mr. Thos. Southworth, seconded by Mr. Wm. Little, and carried, that in the absence of any publication especially devoted to Forestry, the generous

offer of the publishers of 'Rod and Gun' to establish a Forestry Department in that paper be accepted, and that it be adopted as the official organ of the Association, and also that the secretary be authorized to arrange that a copy of the paper be sent each member of the Association if terms agreeable to him can be obtained.

The election of officers was then proceeded with.

The Chairman suggested that His Excellency, Lord Minto, should be asked to graciously accept the Honorary Presidency of the Association, which was agreed to unanimously.

(His Excellency has since kindly expressed his willingness to accept this office.)

The other officers, who were all elected unanimously, are as follows:—President, Sir Henri Joly de Lotbinière; Vice-President, Mr. William Little; Secretary, Mr. E. Stewart; Assistant Secretary and Treasurer, Mr. R. H. Campbell; Directors, Mr. Hiram Robinson, Professor Saunders, Professor Macoun, Mr. Thomas Southworth, Mr. E. W. Rathbun, Mr. C. Jackson Booth, Hon. G. W. Allan.

The Chairman asked for suggestions as to the persons who should be appointed Vice-Presidents for the Provinces and Districts.

The meeting then adjourned.

At a subsequent meeting of the executive committee the following were appointed vice-presidents for Provinces and Districts:—

Prince Edward Island, Hon. Donald Ferguson; Nova Scotia, Dr. A. H. MacKay; New Brunswick, Hon. G. G. King; Quebec, Hon. S. N. Parent; Ontario, Mr. J. B. McWilliams; Manitoba, Mr. Stewart Mulvey; Keewatin, the Lieutenant Governor of Manitoba; Assiniboia, Hon. W. D. Perley; Saskatchewan, Mr. Thos. McKay; Alberta, Mr. Wm. Pearce; Athabasca, Mr. F. Wilson; British Columbia, Mr. H. Bostock, M.P.; Yukon, Mr. Wm. Ogilvie.

ILLUSTRATIONS.

Foothills of the Rocky Mountains.

In connection with the illustration of the effects of fire in the foothills of the Rocky Mountains, the following remarks in the Reports on Irrigation issued by the Department of the Interior, are of interest:—

'In view of the information given regarding the available water supply and the further fact that the watershed furnishing this supply is useless for grazing or agricultural purposes, and, aside from the small amount of merchantable timber which it supplies in certain districts, is only valuable as a catchment area to furnish water to the thirsty plains and open areas lying to the east, it would seem unnecessary to advance any argument to prove the urgent necessity of preserving this watershed in a condition best calculated to improve or maintain its present usefulness as a catchment area; unfortunately, however, public opinion and knowledge on this subject are very erroneous, and it is important, in the inception of irrigation development, to state the conditions clearly.

'In the first place we may assume that any steps calculated to diminish the present water supply are unwise, and if we point out that the rapid destruction of the timber covering the foothill country, which is annually taking place through forest fires, is calculated to seriously affect this water supply, nothing further should be needed to convince the most indifferent observer of the pressing necessity for preventing and checking these fires as far as possible.

'In its present condition the wooded portion of the watershed of our arid regions receives the annual precipitation in the shape of snow and rain, and after sheltering this moisture from the evaporating influences of fierce sun and strong winds, gradually gives it up to feed the numerous springs and small rivulets which, united, form the larger streams bringing the water to points where it can be diverted for useful purposes. With the destruction of these forests will come the sudden freshets and rapid run-off of the moisture from this area, due to the lack of shelter from the sun's rays formerly provided by trees and bush, and without the construction of the enormous and expensive storage facilities required to store this run-off until needed for irrigation, the water must go to waste and serve no beneficial purpose. The permanency of our water supply is, therefore, largely dependent upon the protection of the forests at present covering our watershed, and this protection can only be secured by taking steps to prevent the devastating fires which annually sweep over large portions of the area.'

'By far the largest area in the tract described is covered with brulé, showing either bare slopes with the whitened remains of the old forests standing or lying on the ground, or else the nakedness of the old timber is partially covered by thickets of scrub pine that have sprung up to hide the old bones; nature's method of rehabilitating herself.

'Judging by the standing or fallen timber seen in the brulé, the forests, when green, contained trees of a fair size; and the growth must have been sufficiently dense to retain the moisture on the slopes for a period extending well into the summer, if indeed, it did not last throughout the year. The effect must undoubtedly have been a more evenly distributed flow in the streams, and a less violent run-off in the early spring.'

St. Maurice River.

The view on the St. Maurice River gives a glimpse of one of the most important timber districts of the province of Quebec, one from which large quantities of white pine have been obtained. The great number of logs taken out every season

from a stream like this, as partly shown in the illustration, gives an indication of the immense wealth and extent our forest resources. The necessity for cutting farther back, and the increasing difficulty of reaching suitable timber urge the necessity for investigation of the extent of the supply and the most economic method of making use of our resources.

Scene in the Muskoka District.

The scene is from the Muskoka district and shows the pine as it appears after coming into contact with a not too kindly civilization. It illustrates, however, some of the conditions to be considered by the forester.

The lumber industry was an important one in that district for some time, but continual cutting and the advance of settlement has not left much of the original forests and the more important timber areas are now farther north. The various questions in connection with the preservation and renewal of the pine forests, particularly in Ontario and Quebec, are of the highest importance, and should receive the earnest attention of the Forestry Association.

River Road, Portage la Prairie.

In the year 1859, Professor Henry Y. Hind reported to the Provincial Secretary of the Province of Canada, as follows:—

'In the valley of the Assiniboine is an extensive and valuable forest of oak, elm, ash, maple, poplar, and aspen, with an average breadth of four miles; its length is about thirty miles. The flats and hillsides of the deep eroded valley through which this river flows above Prairie Portage, sustain a fine forest, in which aspen, oak, birch, elm and maple appear to prevail in numbers corresponding with the order in which they are enumerated; but this forest does not extend beyond theexcavated valley of the river or its tributaries. All the affluents of the Assiniboine flow through deep ravines, which they have cut in the great plain they drain; these narrow, deep valleys are well clothed with timber, consisting chiefly of aspen and balsam poplar, but often varied with bottoms of oak, elm, ash and the ash-leaved maple.'

The wooded area in the valley of the Assiniboine upwards from Portage la Prairie is still one of the most important in Manitoba and the view shows the appearance of the river road near that place.

Park Reservation, Lake Louise.

Lake Louise Forest Park Reservation, in the vicinity of Laggan, British Columbia, contains an area of fifty-one square miles and was set apart by Order in Council of July 23, 1892. The reserve lies to the south of the Canadian Pacific Railway along Bow River and Bath Creek and is situated partly in British Columbia and partly in the North-west Territories, at the summit of the Rocky Mountains. It includes a number of high mountain peaks and some lakes, the principal of which is Lake Louise, from which the reservation takes its name. The beauty of the scenery is unsurpassed, and one of the features that adds to its attractiveness are the forests which clothe the valleys and climb the slopes of the mountains to a height of six and seven thousand feet.

Our illustration shows such a forest in this reservation, covering the mountain slope. It is extremely difficult, however, to give a satisfactory view of a large mass of forest as the perspective is lost in the reproduction and the impression of extent and size in the original is gone. Care has been taken to preserve the timber from fire and the valleys are filled with a thick growth of wood, so thickly indeed that a photograph taken at a distance shows an unbroken growth that suggests the idea of moss rather than of forest.

Indian Head Farm.

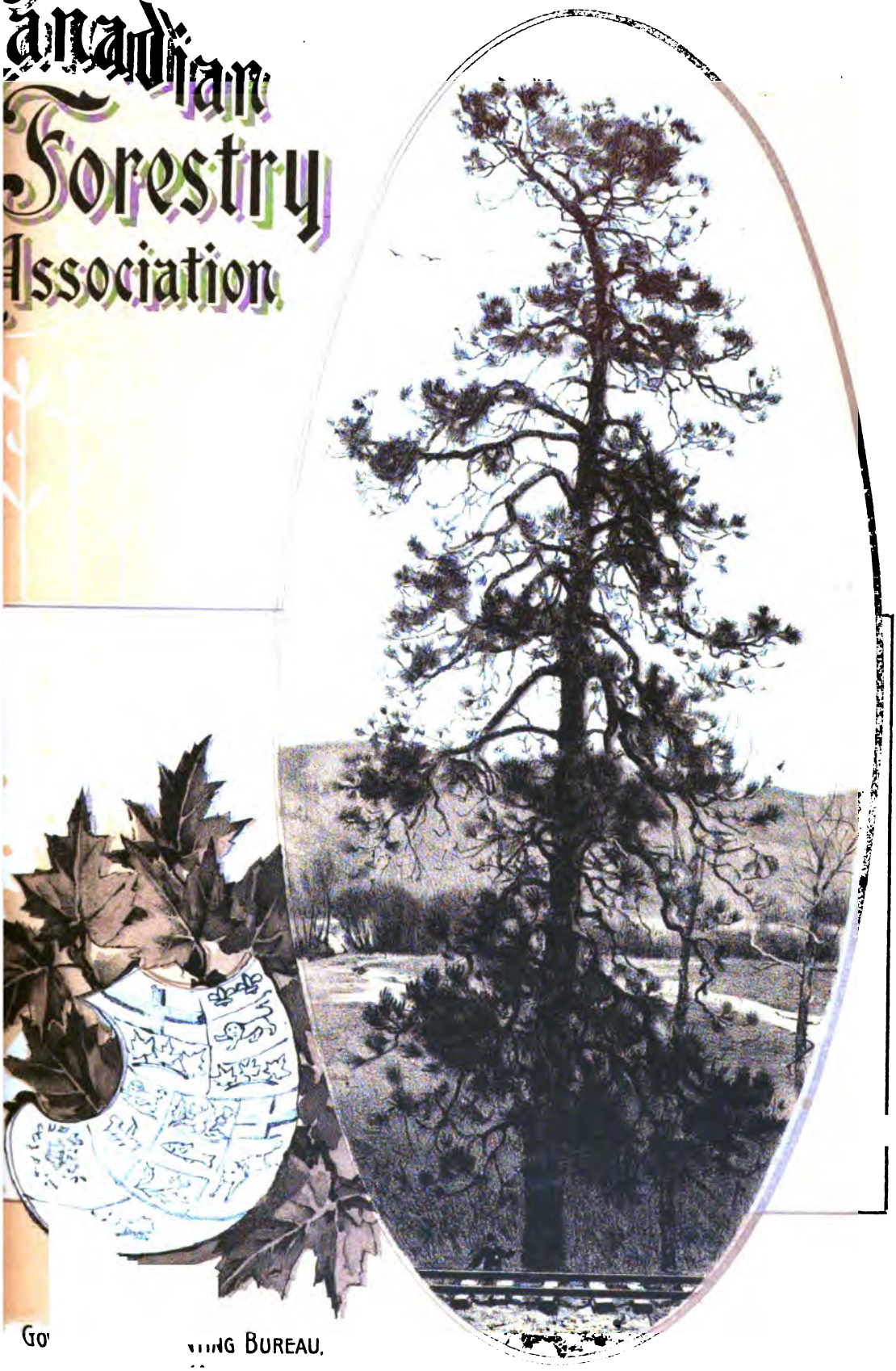
The Experimental Farm for the North-west Territories adjoins the town of Indian Head in Eastern Assiniboia. Indian Head is on the main line of the Canadian Pacific Railway, 104 miles west of the Manitoba boundary, and 105 miles north of the boundary line between the United States and Canada. The soil is of excellent quality. The north half is covered with a black friable clay loam, mixed with a little sand and varying in depth from one to three feet, with a yellowish brown clay subsoil. The soil on the larger part of the south half is a heavy clay loam, with portions of sandy loam. A small creek flows through the farm during the spring months, but this dries up in summer, though by erecting two dams across the ravine a small lake has been formed. The land was an open prairie, without tree or shrub.

To meet the need for shelter on the open prairie land, tree planting on a fairly large scale was begun as soon as practicable, and although at first progress was rather slow, the trees first planted soon formed more or less protection for those put in subsequently. A shelter belt 100 feet wide, made by planting the trees 5 feet apart each way, has been located along the north and west boundaries for $1\frac{3}{4}$ miles. Trees have also been planted in blocks, avenues and hedges.

The illustration shows an avenue of Manitoba maples, seven years growth from seed.

On the St. Maurice River.

anadian Forestry Association



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ING BUREAU.

REPORT

OF THE

SECOND ANNUAL MEETING

OF THE

CANADIAN FORESTRY ASSOCIATION

HELD AT

OTTAWA, MARCH 7, 1901

OTTAWA
GOVERNMENT PRINTING BUREAU
1901

FELLING DOUGLAS FIR IN BRITISH COLUMBIA.

OFFICERS.

HONORARY PRESIDENT,

HIS EXCELLENCY THE EARL OF MINTO, GOVERNOR GENERAL.

PRESIDENT,

HIS HONOR SIR HENRI JOLY DE LOTBINIÈRE, Lieutenant-Governor of British Columbia, Victoria, B.C

VICE-PRESIDENT,

WILLIAM LITTLE, Westmount, P.Q.

VICE-PRESIDENTS FOR THE PROVINCES AND DISTRICTS,

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Quebec.—HON. S. N. PARENT, Premier of Quebec, Quebec.

New Brunswick.—HON. J. B. SNOWBALL, Chatham, N.B.

Nova Scotia.—A. H. MCKAY, LL.D., Superintendent of Education, Halifax, N.S.

Prince Edward Island.—HON. SIR LOUIS H. DAVIES, K.C.M.G., Minister of Marine and Fisheries, Ottawa.

Manitoba.—STEWART MULVEY, Winnipeg, Man.

Assiniboia.—J. S. DENNIS, Assistant Commissioner of Public Works, Regina, N.W.T.

Saskatchewan.—J. G. LAURIE, Battleford, Sask.

Alberta.—WILLIAM PEARCE, Calgary, Alberta.

Athabasca.—F. D. WILSON, Hudson Bay Company, Ft. Vermilion, Athabasca.

British Columbia.—H. BOSTOCK, Ducks, B.C.

Yukon.—The Commissioner, Dawson, Yukon.

Keewatin.—The Lieutenant Governor of Manitoba, Winnipeg, Man.

SECRETARY,

E. STEWART, Dominion Superintendent of Forestry, Department of the Interior, Ottawa.

ASSISTANT SECRETARY AND TREASURER,

R. H. CAMPBELL, Department of the Interior, Ottawa.

DIRECTORS,

HIRAM ROBINSON, Ottawa.

WM. SAUNDERS, LL.D., F.R.S.C., Director of Experimental Farms, Ottawa.

JOHN MACOUN, F.L.S., F.R.S.C., Assistant Director of the Geological Survey, Ottawa.

THOS. SOUTHWORTH, Director of Forestry, Toronto.

C. JACKSON BOOTH, Ottawa.

W. C. EDWARDS, M.P., Ottawa.

HON. G. W. ALLAN, Toronto.

NOTICES.

The Third Annual Meeting of the Canadian Forestry Association will be held at Ottawa, the First Thursday in March, 1902. Arrangements for special meetings may be made by the Executive Committee.

All membership fees should be forwarded to the Treasurer, Mr. R. H. Campbell, Department of the Interior, Ottawa. The annual membership fee is $1 and the life membership fee $10. The membership fee includes a subscription to 'Rod and Gun in Canada' the official organ of the Association.

SECOND ANNUAL MEETING

OF THE

CANADIAN FORESTRY ASSOCIATION.

The Second Annual Meeting of the Canadian Forestry Association was held in the Railway Committee Room of the House of Commons on March 7, 1901. The meeting convened at 10 o'clock a.m., and in the absence of the President, His Honour Sir Henri Joly de Lotbinière, the Chair was taken by the Vice-President, Mr. William Little. Others present were Mr. John Bertram, Mr. John Waldie, Hon. J. B. Snowball, Hon. Wm. Kerr, Hon. T. A. Bernier, Professor W. L. Goodwin, Mr. J. C. Langelier, Mr. J. B. McWilliams, Dr. Wm. Saunders, Professor Macoun, Hon. J. V. Ellis, Dr. Jas. Fletcher, Dr. C. A. Schenck, of Biltmore, N.C., Mr. Geo. Johnson, Mr. Thos. Southworth, Mr. J. M. Macoun, Mr. Wm. Pearce, Dr. Christie, M.P., Mr. Norman M. Ross, Mr. T. S. Young, Mr. Aulay Morrison, M.P., Mr. D. C. Cameron, Mr. J. A. Gemmill, Mr. Hiram Robinson, Mr. W. T. Macoun, Mr. F. G. Todd, Mr. W. N. Hutt, Mr. A. C. Campbell, Mr. R. H. Campbell, Mr. J. J. Bell, Mr. Leighton McCarthy, M.P., Hon. Mr. Emmerson, M.P., Mr. J. Lestock Reid, Mr. J. Vroom.

The minutes of the first annual meeting were read and approved. The secretary read communications from Dr. A. H. McKay, of Halifax, and Hon. G. W. Allan, expressing regret at being unable to attend the meeting.

The following notes in regard to Forestry in Nova Scotia were given in Dr. McKay's letter:—

'According to the Census of 1891, Nova Scotia had about 4,000,000 acres of woodland. A great portion of this was probably not good timber land; and since that date nearly all the timber land belonging to the Crown then has been sold to lumberers and some to the paper-pulp men.

The problem I would like at present to solve, and which is going to take some little time, is the amount of good timber land belonging to the Crown (very little, I fear), the amount of barren or burnt land belonging to the Crown which might be reforested with some kind of productive timber, and, finally, the amount of such land owned by private parties, distinguishing between the small farm owners, and the forest owners proper.

It is the fire which has done the great damage to our forests, and at the present time, perhaps, a few of the lumbermen and especially the pulp men. We have some anti-fire laws; but we have no officers appointed and paid to educate the people, to notify possible offenders, to take measures for the protection of forest property, and to prosecute actual offenders.

I think our governments should take action in two directions: one, to take care of their own lands, improve the bad lands and purchase back from private owners lands capable of being made of value in producing wood; two, to direct the attention of all land owners to the possible advantages of the proper care of wood lands and land of no value except for the wood which it might be made to produce; to publish specific directions for the guidance of those who wish to take advantage of them, and to provide for some education in forestry.

Incidentally we are commencing to do something of this kind in Nova Scotia. In the Manual Training Course provided under late legislation, and with the assistance of the Macdonald Manual Training staff, teachers receive instruction in some of the elementary principles of forestry. And it is hoped that wherever a manual training school in woodwork is established some work of that kind may be done. As much as $600 is

authorized by the statutes to be paid each year to every school board which establishes such a school properly equipped, if the attendance earns the amount.

Then we have our Arbor Day celebration every year in our schools.

But I think our governments might do more than this; that officers should be appointed to publish information, and to conduct demonstrations in different parts of the province.

Our pine woods were destroyed very early. Then the tanning industries stimulated the destruction of the hemlock for the bark alone. Later came the universal lumberer, and last of all the locusts of the forest, the pulp men.'

The report of the Board of Directors was then submitted by the secretary. It was as follows :—

The Board of Directors beg to submit herewith their report of the work of the Canadian Forestry Association for the first year of its existence.

The appointment of the vice-presidents for the provinces and districts is placed in the hands of the Board and under this authority the following gentlemen, with their kind consent, were so appointed: Nova Scotia, Dr. A. H. Mackay, Superintendent of Education; Quebec, Hon. S. N. Parent, Premier of the province of Quebec; Ontario, Mr. J. B. McWilliams; Manitoba, Major Stewart Mulvey; Keewatin, His Honour the Lieutenant Governor of Manitoba; Assiniboia, Hon. W. D. Perley; Alberta, Mr. Wm. Pearce; British Columbia, Mr. H. Bostock; Yukon, Mr. William Ogilvie. The gentlemen whose names were suggested at the first annual meeting for Prince Edward Island, New Brunswick, Saskatchewan and Athabasca have been communicated with but have not responded, and these positions still remain to be filled before the organization of the Association will be completed.

The report of the First Annual Meeting was prepared and issued with as little delay as possible after the meeting, and we feel sure that the manner in which the report was published will meet with the approval of the members of the Association. Through the kindness of the government, and particularly of the Department of the Interior, three thousand copies of this report were issued and were distributed to Senators, Members of Parliament and members of the local legislatures, to lumbermen and others likely to take an interest in forestry matters. With the reports was sent a circular letter calling attention to the objects of the Forestry Association and asking for the support of the recipient.

As a result of this and other efforts made to increase the membership, the number of members now stands at 244, five being life members. The membership is divided as follows as regards the provinces and districts: Nova Scotia, 5; New Brunswick, 6; Quebec, 22; Ontario, 89; Manitoba, 50; Assiniboia, 7; Saskatchewan, 2; Alberta, 44; British Columbia, 12; Yukon, 2; United States, 5.

The revenue for the year ending December 31, 1900, was $192.45 and the expenditure $17.30, leaving a balance of $175.15. The liabilities for the year are greater than shown in this statement as the account for subscriptions to the official organ was not received in time to be dealt with before the close of the year. The balance now standing to the credit of the Association is $246.50, the receipts during the present year (including the balance from 1900) being $284.50 and the expenditure $37.50. The present outstanding liabilities, being principally accounts in connection with this meeting, are about $30.00, and the subscriptions to the official organ for the present year will be $122.00, leaving a balance of $85.00. The unpaid subscriptions are $88.00, making $173.00, which will be available for the general work of the Association during the present year.

In accordance with the motion passed at the last annual meeting, negotiations were entered into with the publishers of 'Rod and Gun in Canada,' and on the basis of a twenty-five cent subscription rate for the remainder of the year then current it was decided to designate this paper the official organ of the Association and to have it furnished to the members, paying the subscriptions from the funds of the Association. This arrangement was only temporary and at the end of the year it was necessary to again open negotiations and the publishers then submitted an offer of fifty cents per

subscription for a full year and twenty-five cents for a half-year. Though the acceptance of this offer will necessitate the devotion to this purpose of a very large proportion of the revenue of the Association, yet it is felt that from the point of view of the publishers the amount is reasonable and, as an official organ is absolutely indispensable, the Board are of the opinion that the arrangement outlined is the most satisfactory that can be made under present circumstances and therefore recommend its approval by the Association.

Provision was made for the conduct of the Forestry Department in 'Rod and Gun,' space for which was arranged for as part of the agreement with the publishers, by the appointment of Mr. E. Stewart as editor and Mr. R. H. Campbell as sub-editor. The editors are making every effort to render this department as interesting and useful as possible, and so far as the space at their disposal will permit, to give attention to all branches of the work of the Association. The field to be reviewed is so extensive that with our present facilities this task is one of some difficulty, and as the resources of the Association increase with its increasing growth, it may be necessary at some future time to make arrangements that will be more adequate to the large scope of its operations. We urge upon the members the desirability of giving all possible assistance to the editors. They will be pleased to receive at any time records of observations or experiments in tree planting and forestry or notes on any matters of interest, and will welcome any suggestions as to subjects which should be dealt with. We hope that advantage will be taken of the question drawer which has been opened in the official organ, as the gentlemen who have so kindly undertaken to answer questions submitted possess the highest qualifications for this work, being leading men in the Dominion in their different branches of knowledge.

As a result of the work of this association and largely through the efforts of our honoured president, who is now the Lieutenant-Governor of British Columbia, a number of meetings in the interests of forestry were held in that province, and a Provincial Forestry Association has been formed. The timber resources of our Pacific Coast province are so extensive that their management is well worthy the most careful study, and we hope that the Provincial Association may be able to have the question thoroughly investigated so that the proper policy to be adopted may be made clear. The probable early construction of a new railway across the West and through the province suggests the possibilities of destruction to the forests in its vicinity by ease of access and ignorance of their value, and the necessity for taking such steps as may be possible to prevent so unfortunate a possibility from becoming a reality.

By the kindness of the Canadian Institute, a forestry meeting was held in Toronto under the joint auspices of the Institute and our Association on the 12th of January, and on the 21st and 22nd of the same month a conference on the subject, with special reference to the question of forestry education, was held at Queen's University, Kingston, the chief part in which was taken by Dr. B. E. Fernow, Principal of the New York College of Forestry. These meetings have done much to call attention to the work of the association and arouse an interest in forestry. The conference at Kingston was not initiated by this Association, but the Association was represented at its deliberations.

A large number of meetings have been held in the West recently by Mr. Stewart, Dominion Superintendent of Forestry, and as a result a considerable addition has been made to our membership there, local circles of the Association having been formed at Winnipeg, Virden, Brandon and Crystal City.

During the past year two timber reserves, which call for special mention, have been set apart. In Manitoba all the lands north of township 38 and west of Lake Winnipegosis, estimated at 1,250,000 acres, have been reserved from settlement, as most of this tract is already well timbered and known to be largely unfitted for settlement. The intention is that this district should be carefully examined and only those portions of it which prove more suitable for agricultural purposes will be thrown open. The Ontario government has set apart another reserve of about a million and a half acres surrounding Lake Temagaming, which not only includes a large quantity of white pine and other timber, but covers the head waters of a number of streams flowing into Lake Nipissing and the Ottawa river.

This latter reserve may be considered as one of the results of the work of the Ontario Forestry Commission, whose able report was published a short time ago. This report is the result of a careful investigation of the white pine, and may well form the basis for the consideration of the policy to be adopted in the management of this important timber tree. This Association should use its influence to assure that the matter should not be dropped with the publication of this report, but that the investigation should be continued on the government reserves or elsewhere until the best possible method of management is worked out. The whole future interests of this important source of provincial revenue require that this work should be done thoroughly and scientifically.

The great extension of the pulp industry and the demand created thereby for spruce timber especially render it advisable that a special study of this tree should also be made so that we may know what our resources for this purpose are and when and how steps should be taken to ensure that the returns from this source of wealth should be retained at the highest possible permanent figure.

Tree planting on farms, and particularly on the great plains of the West, is now receiving more of the attention which it deserves. It is a subject for congratulation that the Dominion government is giving special consideration to this question, and we hope the deliberations of this Association may result in proper support being given to any properly devised plan for advancing this work.

While all the steps in the development of the forestry policy of Canada may not yet be perfectly clear, the necessity for, and the method of the preservation of the present timber supply are sufficiently evident to justify your Board in urging that the influence of the Association should be used to secure that the Forest Fire Acts of all the provinces should be made as effective as possible, both by proper provisions and a wide-spread advertisement of them. The extension of the fire ranging system should also be urged when the necessities of the case will permit.

Recognizing the advantage of having a strong public sentiment behind any governmental action, and believing that there is a latent and hitherto unexpressed feeling in the country in favour of both the federal and provincial governments giving more attention than heretofore to the forestry problem, your Board would suggest the advisability of holding during the current year a number of public meetings in the large centres of population, similar to those recently held in Toronto and Kingston.

Your Board feel that they would fail in their duty if they did not make mention of the kind assistance the Association has received from various quarters from the press of the country; from the various kindred societies and departmental officers, both here and in the United States, and especially from the railway companies of the country, which have been exceedingly generous in furthering the interests of the Association.

The report of the treasurer for the year 1900 was read, which showed receipts of $192.45 and expenditure of $17.30, leaving a balance of $175.15.

On motion of Mr. E. Stewart, seconded by Professor Macoun, these reports were adopted.

It was moved by Professor Macoun, seconded by Mr. Wm. Pearce, that Mr. Geo. Johnson and Mr. J. M. Macoun be appointed auditors.

The next item in the order of business was the president's address, and the chairman addressed the meeting as follows :—

'In the absence of the president it falls to me to say a few words. It is regrettable that he is not present, but he has been called to a higher station, that of Lieutenant-Governor of British Columbia. I presume that the enormous trees have attracted him away from us. He has, however, written a letter to Mr. Stewart expressing his interest in the Association and his regret at being unable to be present and has also telegraphed that owing to the session of the legislature he is prevented from coming to Ottawa. There are several things of importance which have occurred since we met here last year. One of them-one of the most serious losses that any country could have suffered, is the loss of our Queen, and in this case I shall actually have the privilege of

using the words of the president in his address to the legislature of British Columbia:—"I trust you will take an early opportunity to pass an address of condolence to the Royal family expressing the deep sense of bereavement we all feel, and while deploring the event which rendered necessary the succession of Albert Edward, Prince of Wales, it is a satisfaction nevertheless to welcome as our ruler one upon whom we can rely to follow in the footsteps of his mother, and I will ask you to couple with your resolution of condolence one of welcome and congratulation to our new Sovereign, King Edward the Seventh, on his accession to the throne." I think that this expresses our feelings as well as it can be done. You will be asked to appoint a committee to present some suitable memorial to His Majesty King Edward. This committee should, I think, also prepare a resolution expressing our appreciation of the services of the president and regret at his inability to be here.'

On motion of Mr. Stewart, seconded by Mr. J. B. McWilliams, Dr. Wm. Saunders, Mr. Wm. Pearce, Mr. Geo. Johnson, Mr. A. C. Campbell and Mr. Thomas Southworth were appointed a committee on resolutions.

A paper on 'Forestry in British Columbia' by Mr. J. R. Anderson, Deputy Minister of Agriculture for that province, was read by Dr. Wm. Saunders.

FORESTRY IN BRITISH COLUMBIA.

By J. R. Anderson,

Deputy Minister of Agriculture for British Columbia.

At the present time British Columbia probably possesses within its limits larger unbroken areas of primeval forest than any other country in the world, and is destined in the near future to be the principal source of supply of timber and wood pulp. Hence the question arises how best to conserve our forest wealth to the best advantage and for the greatest good.

British Columbia, it must be premised, is a province of vast extent, extending as it does from the forty-ninth degree of latitude on its southern boundary, to the sixtieth degree on its northern boundary, bounded on the west by the Pacific Ocean, and on the east by the 120th degree of longitude and the Rocky Mountains.

The climatic conditions within this great area, owing to natural causes, it can easily be imagined, are most variable and calculated to suit the requirements of many different kinds of forest trees. Amongst the most prominent of them I make mention of the following. And here I may explain that the descriptions are largely quotations from a report I made some years ago, at the request of the Admiralty, and will serve, to some extent, to give an idea of the forest resources of British Columbia. I reproduce my remarks with all diffidence, and subject to correction, as I am quite aware of my liability to err in statements involving interests of such magnitude.

Without doubt the timber of greatest economic value in the province, and of which there is the greatest quantity, and most generally distributed, is the Douglas Fir, sometimes called Red Fir and Oregon Pine; it is now known under the botanical name of *Pseudotsuga Douglasii*—Carr.

Synonyms—

Pinus taxifolia, Lamb.
Abies Douglasii, Lindl.
Abies mucronata, Raf.
Pinus Douglasii, Lamb.
Abies Douglasii, Lamb.
var. *taxifolia*, Gordon.

Its range may be said to practically extend to the whole of the province with the exception of the Queen Charlotte Islands, where it is said it does not grow, and it accommodates itself to all altitudes from sea level to 6,000 feet; at great altitudes, however, it only grows in a very stunted form. Dawson says: 'The best grown specimens are found near the coast, in proximity to the waters of the many bays and inlets

which indent it. Here the tree frequently surpasses eight feet in diameter, at a considerable height above the ground, and reaches a height of from 200 to 300 feet, forming prodigious and dark forests.' My own experience is that Dawson is quite right in his remarks, and therefore it will readily be seen that the shipping facilities are exceptionally good for the best qualities of this useful timber. Amongst the uses it is put to, I may mention house building, ship building, bridging, wharfs, piles, masts, furniture, fencing, &c. When growing singly in the open it forms a very beautiful and useful shade tree, the branches starting from near the ground and growing out very thickly along the stem, it is however practically useless for commercial purposes when growing in this form, and it is only useful when growing thickly together in dense forests. In the latter state it grows without branches except at the top, and so yields timber of immense size and length, without knots, particularly suited for bridging and similar works. In this country it is not particularly liable to attacks of insects and dry rot, except when immersed in the sea, where it (in common with most of the other woods of the country) is subject to the attacks of the *Pennulifera teredo.* When submerged or buried under ground, away from the influence of the air, it is very durable, and will in these positions last for many years, it soon rots however if left lying on the ground exposed to damp. The usual methods of seasoning for ordinary purposes is by piling the manufactured wood in the open air and allowing a free circulation of air to pass through the pieces. When used for furniture and cabinet-making it is usually seasoned in a hot air chamber. As much as 508,000 feet of good lumber have been cut off one acre in the Comox district, and this, although trees under two, and over seven feet in diameter, were not used. This is by no means the only instance recorded of so large a cut.

The wood next in importance is probably the CEDAR, generally known as Red Cedar, (it is also sometimes called Yellow Cedar), not to be confounded with yellow cypress or cedar, botanically it is known as *Thuya gigantea*, Nutt,

Synonyms—
Thuya plicata, Don.
Thuya Menziesii, Dougl.

This tree is very generally distributed on Vancouver Island and the coast of the mainland to the westward of the coast range. Scarce in the dry central plateau, it however, again occurs in considerable quantities in the Selkirk and Gold Ranges of the mountains. As in the case of the Douglas fir, the finest specimens are to be obtained in proximity to the sea coast. Here the tree attains an immense size, some idea of which may be formed from the fact that some of the native canoes which are all hewn out of the trunks, are six feet and more from the level of the gunwale to the bottom. An Indian plank hewn out of this wood is at present at the museum here, the dimensions of which are five feet wide by fifteen feet long, and this is by no means anything like as wide as others on the west coast. Although second in importance as regards its economic value it is a more valuable wood than the Douglas fir, being used principally for interior finishing, cabinet making, doors, shingles, and posts. It is very ornamental when properly finished, splits well and lasts a long time in the ground In a specimen bundle of split shingles sent by this department to the Chicago Exhibition, each shingle measured twenty-two inches wide; and split boards quite straight from twelve to fifteen inches wide, and twelve feet long. As regards attacks of insects, dry rot, seasoning and accessibility for transportation, my remarks under Douglas fir will also answer for this wood. As an ornamental tree it has few equals, and is certainly the finest of our native trees.

Very little below cedar as regards its economic value is the WESTERN SPRUCE, botanically known as *Picea sitchensis*, Carr.

Synonyms—
Pinus Sitchensis, Bong.
Abies Menziesii, Lindl.
Pinus Menziesii, Dougl.
Abies Sitchensis, Lindley and Gordon.

Logging by Oxen in British Columbia.

Dawson says 'This tree seems to be confined chiefly to the immediate vicinity of the coast of British Columbia, where it attains a large size.' It grows in large quantities in all low lying land in the vicinity of the coast, and is therefore easily accessible for transportation. Its height is not so great as that of the Douglas fir, but if anything it is larger at the butt; I myself saw one which measured nearly sixteen feet in diameter. The wood of this tree is very white and light, resembling white pine, but is more elastic and will bend with the grain without splitting. It is therefore much used for boat building, light spoon bladed oars, boxes, shelving and interior work. It lasts a long time without decaying, and is an equally good insect resistant as the Douglas fir. As the shrinkage is usually very great, it is generally kiln dried before using, or kept stored away until it is thoroughly seasoned. On account of the sharp pointed short fronds it is quite impossible to grasp them with the naked hand, and this renders this tree easily distinguished from the other British Columbia *Coniferæ*.

The YELLOW CEDAR or Yellow Cypress, probably ranks next in its economic value. It is known botanically under the name of *Thuya excelsa*, Bong.,

Synonyms—
Cupressus Nutkœnsis, Hook.
Chamœcyparis Nutkaensis, Spach.

This tree is not nearly so plentiful as any of the foregoing, its range being confined to the coast ranges of the mainland and islands, generally at a considerable elevation in the southern part of the province where it occurs in no great quantities. On Queen Charlotte Islands, however, Dr. Dawson says, it is abundant and reaches the sea level, it there also attains a size of six feet and more in diameter. In my experience I have seldom seen it over four feet. On account of its beautiful colour and close grain it takes a high polish and is susceptible of being manufactured into beautiful articles of furniture and interior decorations, hence it commands a much higher price than the woods previously mentioned. It is highly esteemed for ship building as it is very durable, and is generally credited on account of its strong, pungent, but rather agreeable odour to be *teredo* resistant; of this however I am not prepared to vouch. The natives of the northern part of the province use it largely for paddles, carvings, boxes, and articles of domestic use. It is said, that on account of its liability to shrink lengthwise, as well as laterally, it requires to be well seasoned before use. The expense of bringing this timber to shipping points is somewhat great, except in the northern part of the province, where it abounds near the sea coast. The long and slender pendulous fronds which hang from the branches give the tree a very graceful appearance, and the strong pungent odour which the wood emits when freshly cut and which it never loses, renders it very easy of identification.

The HEMLOCK, known botanically as *Tsuga Mertensiana*, Carr,

Synonyms—
Pinus Mertensiana, Bong.
Pinus Canadensis, Bong, var. B, Hook.
Abies Mertensiana, Lindl.
Abies Albertiana, Murray.
Pinus Pattoniana, McNab.
Abies Pattonii, McNab.

is, except the bark, practically unused at the present time. Its range extends over the whole of the coast line, where it grows to an enormous size in dark gloomy forests, generally barren of other vegetation, except scattered bushes of the Whortle Berry (*Vaccinium parvifolium*), with a thick carpet of moss covering the ground. The bark is extensively used for tanning, but the wood, although good for inside work, is liable to decay when exposed to wet. It is but fair to say that partly on account of the abundance of other coniferous woods, and the prejudice existing against it, it has never been fairly tested and it is quite possible it may possess unexpected virtues. As its habitat is generally at no great distance from the sea, it is a wood which could be transported to shipping points without great expense. When young or growing singly the tree is

decidedly pretty, and the yew-like fronds which enshroud the trunk form a most welcome and soft bed for the weary prospector or trapper.

The WESTERN WHITE FIR or Balsam Fir, *Abies grandis*, Lindl.

Synonyms—

Pinus grandis, Dougl.
Picea grandis, Loudon.
Abies Gordoniana, Carr.
Abies amabilis, Murray.

is quite common in the vicinity of the coast and grows to a large size, but the wood is held in small esteem, being perishable and brittle. It is, however, white and light and may in course of time be put to use for boxes, &c. The bark when young is thickly covered with large bladders or cells filled with a liquid resinous gum which has great healing properties.

The tree with its thick flat fronds and rigid growth, although grand in appearance, is rather too stiff and formal and of the Noah's Ark type to be quite pleasing.

The WESTERN WHITE PINE known as *Pinus monticola*, Dougl.,

Synonyms—

Pinus strobus, Dougl., var. *monticola*, Nutt.
Pinus porphyrocarpa, Lawson.
Pinus strobus, Hook, in part.

Dawson says:—'It is found in scattered groups but in no great quantities, on the slopes of the mountains of the interior where the rainfall is plentiful, and in certain parts of the interior of Vancouver Island, it is abundant and is found in all parts of the southern portions of the Coast Range where there is an abundant rainfall.' This wood is nearly identical with and nearly equal to the celebrated 'King of Woods' as it is called, the White Pine (*Pinus strobus*) of Eastern Canada. It has, however, thus far been but little utilized, partly on account of the difficulty of getting it in sufficient quantities together, and partly on account of the expense of transporting it to shipping points. It is the most useful wood for window sashes, doors, powder barrels and similar work. Being a white and very light wood it is unsuitable for outside work, and has a tendency to absorb moisture when in contact with the ground and is therefore liable to decay. It is a very grand looking tree with long bluish-green fronds, and cones from eight to twelve inches long.

The other coniferæ of the province do not in my opinion require special descriptions growing as they do in comparatively limited quantities, many of them in the interior of the country, and only used in default of better timber. Some of the principal varieties are—

WESTERN YELLOW PINE or Bull Pine. *Pinus ponderosa*, Dougl.

Synonym—

Pinus resinosa, Hook., in part.

Its habitat is the dry plateau of the interior mainland between the coast and gold ranges. It is a remarkably handsome tree with smooth red bark, very long fronds and large cones bearing a large quantity of seed which the natives formerly used as an article of food.

SCRUB PINE, *Pinus Contorta*, Dougl.

Synonyms—

Pinus inops, Hook., in part.
Pinus banksiana, Lindl. & Gordon, in part.

Its habitat is everywhere in the province on sandy points and exposed rocky points, seldom growing larger than fifteen inches in diameter, and being quite useless for timber and not at all ornamental.

BLACK PINE, *Pinus Murrayana*, Balfour.

Synonyms—
Pinus contorta, Macoun, in part.
Pinus contorta, var. *latifolia* Dawson.
Pinus inops, Hook., in part.

Its habitat is on the slopes of the mountains of the interior of the province, where it grows in dense masses very straight and long, but of no great size. It is most useful for mining purposes, being strong and durable and the only wood procurable in many of the mining districts. It is said to make excellent charcoal, the only coniferous wood to my knowledge that is used for the purpose.

WESTERN LARCH or Western Tamarack, *Larix occidentalis*, Nutt.

Synonyms—
Pinus larix, Dougl.
Pinus Nuttallii, Parlatore.

It is found on the slopes of the mountains of the interior mainland, and is used for rails, interior fittings, and shakes or shingles, where cedar is not available.

There are several other coniferous trees of the fir or pine and juniper order which I do not think it necessary to mention particularly.

BROAD LEAVED MAPLE, *Acer macrophyllum*, Pursh. This is probably the commonest and best of our deciduous woods. Its range is all over the lower lands of Vancouver Island, the gulf islands and the mainland to the westward of the coast range. It grows to a large size, the trunks frequently attaining a diameter of three or four feet, and when growing close together or with other trees, very straight and tall. When growing singly in the open it forms a magnificent shade tree, one remarkable specimen near Victoria covering a space of probably eighty feet in diameter. The wood is close-grained, takes a fine polish, and is well adapted for furniture, inside finishing and carriage building. That part which by reason of an abnormal growth is known as Bird's Eye Maple is very beautiful.

Although used by furniture makers in some cases for inside work it is comparatively little used, and is only cut by one or two mills to supply the demand.

There are two other native maples, viz.: the Vine Maple, *Acer circinatum*, Pursh., and another resembling it called *Acer glabrum*, Torr. The former is common on the low lands of the mainland to the westward of the coast range, but does not occur to the eastward of the coast range, nor on Vancouver or Gulf Islands. As its name implies, it only grows small and crooked, much in the shape of a vine. The latter occurs all over the province, principally in the dry belt to the eastward of the coast range, where it never gets beyond a bush, and on the islands where it frequently attains to the dignity of a small tree.

ALDER, *Alnus Rubra*, Bong.

Synonym—*A. Glutinosa*, Pursh.

This is another common tree on Vancouver and Gulf Islands and on the mainland to the westward of the coast range. It attains in many places a diameter of two to three feet but much of it is under two feet. Growing as it does in close forests it runs up to a considerable height and is very straight. The wood which is of a light brownish colour nearly white, resembles black walnut in the grain, and is used, stained to the proper shade, to a limited degree, in imitation of that wood, for furniture, inside furnishing, bannisters, &c.

The only other representative of this genus is the MOUNTAIN ALDER, *A. rhombifolia*, Pursh, a worthless variety and more of a shrub than a tree, its range is general throughout the province, usually on mountain sides.

POPLAR or Cottonwood, *Populus Trichocarpa*, T. & G., (sometimes called *P. Balsamifera*, Lyall,) is a common tree throughout the province on low lying lands in the

vicinity of water. It attains to a large size in favourable localities, three to four feet in diameter being common, and reaches a great height in dense forests along river banks and on low islands. The wood is very little used, being white and soft, without any great quality to recommend it. The principal use it has been put to is for the manufacture of excelsior for which purpose it is well adapted. It has also been used for boxes, being very light, but the objection to its use for this purpose, I am informed, is that it turns dark after being sawed. Possibly this difficulty could be overcome by allowing the wood to season in the log or by other methods.

Another representative of this genus is the ASPEN POPLAR, *P. tremuloides*, MX. Its range is also very wide occurring as it does in all parts of the province. It does not attain to any great size, twelve inches being probably about the limit. The principal use it is put to is for fence rails in that portion of the province to the eastward of the coast range where other timber is scarce.

WESTERN OAK, *Quercus Garryana*, Dougl., or Q. *Jacobi*, R. Br. The range of this tree is altogether confined to Vancouver Island and the Gulf Islands, not a single specimen occurring on the mainland. Patches of it occur at the southern end of Vancouver Island and for about one hundred and fifty miles north. In some places it attains a size of from three to four feet in diameter, with good straight trunks from which logs can be obtained ten to twenty feet in length. It is likewise a highly ornamental shade tree. The wood resembles English oak in appearance, having a beautiful grain, but it has never been much used, principally, I believe, on account of the difficulty of seasoning it properly or rather the necessary room and capital for storing it away for several years. It is used to a limited degree by cabinet makers, &c., for ornamental furniture and other purposes of that kind.

CANOE BIRCH, *Betula Papyrifera*, MX., is common on the mainland and very scarce on Vancouver Island. The wood is a good fine-grained durable one when not exposed to the weather, but it has never been used to my knowledge for any purpose but for firewood. It attains a size of from one foot to eighteen inches in diameter, but is often smaller.

ARBUTUS or MADRONA, *Arbutus Menziesii*, Pursh. This is quite a common tree on Vancouver and Gulf Islands and on some parts of the coast line of the mainland. It is a striking looking tree with its red bark and bright evergreen leaves. As a rule it does not attain to a great size especially when growing on exposed rocks and headlands, but trees a foot in diameter are common although as a rule twisted and crooked; when growing in forests, however, it grows fairly straight and sometimes attains a large size. On the Alberni Road, in the vicinity of Nanoose Bay, many fine specimens are to be seen. When travelling with Dr. Fletcher and Rev. Mr. Taylor two years ago, I took the measurement of one tree which was ten feet five inches in circumference. I am not aware that the wood of this tree has been put to any particular use, it is hard, fine and close-grained and takes a good polish, but it is apt to warp and check if cut before it is well seasoned.

DOGWOOD, *Cornus Nuttallii*, And. A highly ornamental tree with immense white flowers, fairly abundant throughout the islands and the coast of the mainland. It often attains a size twelve inches in diameter and a height of thirty feet or thereabouts, and has a fine-grained hard pinkish wood which takes a good polish. It is not used to my knowledge, except in isolated cases, for ornamental work.

BUCKTHORN, *Rhamnus Purshiana*, D.C., (sometimes called Bearberry, and from that often wrongly called Barberry) is a not uncommon tree on the islands of Vancouver and the Gulf and on the coast of the mainland. It attains a size of about a foot in diameter, but is more frequently smaller. The wood is of a light yellow colour close-grained and hard, and is not much used except for ornamental purposes. The bark of this tree is known in medicine as *Cascara sagrada*.

CRAB, *Pirus Rivularis*, Dougl., grows commonly in swamps on the mainland to the westward of the coast range, on Vancouver Island and the Gulf Islands. It seldom attains a larger size than nine inches, the wood is hard and close grained, and is principally used for rollers in mills and similar purposes.

FOREST PRODUCTS.

The following is from a paper supplied by the government to the Forestry Commission at Chicago in 1893, but I am not now prepared to vouch for the correctness of the figures.

AVERAGE CUT.

The average cut is easily 50,000 feet per acre. On the mainland and Vancouver Island it has varied from 20,000 to 500,000 feet per acre.

Messrs. King and Casey cut 508,000 feet on one acre in the Comox district. This is not the only instance of so large a cut. And this although trees under two feet and over seven feet were not used.

QUANTITY ON THE PRESENT LIMITS.

The acreage is at least this year (1893) 400,000. Suppose the average to be 30,000 feet to the acre. This would give 12,000,000,000 feet on the limits now occupied.

CUT PER ANNUM.

In 1892 the cut was 64,000,000 feet. Add for waste and cut unreported say 40,000,000 feet. This would give 100,000,000 feet. At this rate the present limits would last 120 years. This, however, supposes an average of 30,000 feet per acre, no bush fires, and no increase in the annual output.

It is estimated that fire destroys fully fifty per cent of the timber. This reduces the time from 120 to 60 years. However, the output must rapidly increase and will in the near future be treble what it is to-day. At this rate of cutting the present limits would be worked out in twenty years.

Some say one-third of the limits of the province are taken up. Suppose the entire acreage (of the average 30,000 feet to the acre) be three times that taken up now. This would give 1,200,000 acres. The time required to cut the entire amount at three times the above output would be sixty years.

Although various causes will hasten the lessening of our forests, the natural growth must add considerably to the amount above stated.

The chief element of destruction is fire, which should be guarded against both by the mill-owners and the government.

EXPORT FOR THE FOUR YEARS ENDING JUNE 30, 1894.

To all countries including the United Kingdom :—

		Value.
Burrard Inlet	136,054 M feet.	$1,385,980
Victoria	8,352 "	70,541
Nanaimo	6,532 "	55,128
New Westminster	5,900 "	50,012
	156,838 "	$1,561,661

To the United Kingdom alone:—

Burrard Inlet	7,161	M. feet	$113,304
Victoria	30	"	255
Nanaimo	836	"	12,180
New Westminster	nil.		
	8,027	M. feet.	$125,739

The quantities are approximate but the values are accurate and include fir, cedar and spruce planks, boards, deals, spars, masts, square timber, laths, poles and posts.

FOREST LEGISLATION.

The provisions of the Acts relating to the Forests are succinctly as follows:—

The Chief Commissioner of Lands and Works is authorized to grant special licenses to cut timber on Crown lands.

No such license is granted for a larger area than one thousand acres, nor for a longer period than one year. A license costs $50.

The license entitles the holder to all rights of property whatsoever in all trees, timber or lumber, within his limits.

The Chief Commissioner of Lands and Works is also authorized to grant a general license to hand loggers, upon payment of ten dollars, to cut timber upon Crown lands, not being timber limits, without any reservation as to area. Such license is personal, however, and limited to one year.

A ground rent of five cents per acre is charged and a royalty of fifty cents per thousand feet board measure for general timber suitable for spars, piles, sawlogs, railroad ties, props, shingle bolts of cedar, fir or spruce, and a royalty of twenty-five cents for every cord of other wood.

A drawback is allowed on exported timber, equal to one half of the royalty. 'Timber lands (that is lands which contain milling timber to the average extent of eight thousand feet per acre west of the Cascades, and five thousand feet per acre east of the Cascades, to each one hundred and sixty acres) are not open for sale.'

Under the Bush Fire Act any portion of the province may be created by Order in Council, a fire district. It is unlawful to start a fire in a fire district between 1st of May and 1st October, except for clearing land, cooking, obtaining warmth or for some industrial purpose. Precautions must be taken in clearing land not to allow fire to spread and in other cases fires must be extinguished before leaving.

Locomotives are required to have spark screens on their smokestacks.

Now whilst the provisions of the Acts relating to forest conservation are good, as far as they go, the difficulties of enforcing them in a country but sparsely settled are so great that many of them are practically inoperative, and the question naturally arises as to how can this be remedied. The elaborate and undoubtedly efficient remedies pursued in older countries, notably Germany, are not suited to a wild country. The cost alone of maintaining an army of forest rangers is sufficient to appal any government undertaking the task, and after all would such a system be efficient? I doubt if it would, except to a limited degree. Those areas of forest lying beyond the limits of civilization would still be liable to the devastating influence of forest fires, set out in many instances by prospectors in search of mineral wealth, in others by carelessness, and in some instances possibly by natural causes. Nevertheless no other system seems apparent, and if properly managed, it could, I believe, be made effective in those portions of the province adjacent to settlements and where the operations of the lumbermen and woodmen are carried on and where also by special taxation the system might be made self-sustaining.

In conclusion let me say to those members of the Canadian Forestry Association who have not visited the West that they have yet to see a forest in all its magnificence.

LOGGING BY STEAM IN BRITISH COLUMBIA.

No other word seems to me to convey a proper idea of a virgin forest of the West. Picture to yourselves thousands of trees, Douglas fir predominating, of prodigious size, so close together that it is difficult, and often impossible, for an animal to go between, limbless except the tops, through which the rays of the sun scarcely penetrate, the ground carpeted with mosses and ferns, and the hush of nature all around you, and you can perhaps form some idea of a forest in British Columbia.

Dr. WM. SAUNDERS.—I can quite endorse all Mr. Anderson has said as to the enormous timber resources of the province of British Columbia. I have visited specially in the district between Victoria and Nanaimo. In going through the forest about thirty or forty miles from Victoria on one occasion I came across a piece of wood where the trees were so thick it was difficult to get about amongst them. One tree had been felled and I made a measurement of it. It was four paces across the stump or at least 11 feet in diameter. One hundred and sixty-five feet were perfectly clear of branches and there were 50 or 60 feet of branches above that, making its height over 200 feet. This was representative of a large number there and did not exceed the others much in size. It impressed me with the idea of the enormous wealth of timber in British Columbia. This forest extends along the coast line. Practically for 500 miles north from the American boundary there is not much change in the general character of the timber.

While speaking on this point I would like to refer to some experiments in tree planting which have been undertaken at the Experimental Farm which, I believe, are the only experiments of this kind in British Columbia. The Experimental Farm at Agassiz has an area of 1,100 acres, only 400 of which is valley land, the remaining 700 acres being mountain having a height of about 1,200 feet. Up the sides of these mountains there are quite considerable areas of land so large that we have cleared between the level of the valley and the summit of the mountain immediately in the rear of the buildings of the Experimental Farm a space for orchards and have about 1,000 apple and other fruit trees growing. Scattered on the southern slope of the mountain at the back of the buildings there are twenty-five or thirty thousand young forest trees which were planted out when from one to two feet high. These consist of black walnut, hickory, elm, eastern varieties of ash and oak. They grew rapidly and in a belt which was planted in the valley land they made extraordinary growth, showing that the climate is admirably adapted for such trees. A specimen of black walnut planted in 1889 must be between thirty and forty feet high with a very good growth around the trunk. The ferns which grow so very high on the slopes of the mountains and at the tops proved a serious obstacle to growing young trees unless the ground about them was cleared. This fern is *Pteris aquilina*, var. *lanuginosa*. These had the effect of shadowing and partly smothering the trees. During the past five or six years the trees have made upward growth and looking at the face of the mountain in the present season you can see the outcrop of the forest trees which have got above the ferns. I have no doubt that in a few more years this will be an interesting experiment which will show that the trees of the harder woods are adapted for that country. The rapid growth of the hardwoods there will not necessarily interfere with the quality of the timber. This is an important point in connection with the future of timber growing in British Columbia. While the natural growth there is something enormous and it may not pay to go into growing trees to any extent, I think that the planting of hardwood trees on the slopes of the mountains may be a paying branch of business.

PROFESSOR MACOUN.—Mr. Chairman, I will not take up much of the time of the meeting, but I may say that I paid particular attention to Mr. Anderson's paper. He gave a thorough description of the forest trees west of the Cascade mountains. To those acquainted with British Columbia it would be apparent that he says nothing of the interior. Now I wish to say that his paper is absolutely valuable for the coast and Vancouver Island. In speaking of Comox, he mentions 508,000 feet as the product of one acre, but they only cut the trees between two and seven feet in diameter. There are trees that run up to twelve feet. Looking at the land near Union Mine, near Comox, there is a tract there where the trees stand like enormous columns with bases of twelve or fifteen feet. After the trees rise five or six feet they slope inwards and a hole is

cut in the trunk and a plank shoved in on which the chopper stands to fell the larger trees so that when Mr. Anderson says 508,000 feet to the acre he is quite within bounds.

About the yellow cedar and pine, I want to elaborate Mr. Anderson's statements. The reason he does not say so much on the yellow cedar, *Cupressus*, is that it is not found at the coast in southern British Columbia and Vancouver Island. You have to go up Mount Benson at Nanaimo 1,200 feet before you reach the belt of yellow cedar and you have to go up 500 feet more before you get yellow pine, *Pinus monticola*, and if you make the ascent I speak of on any mountains in British Columbia, west of the Coast Range you will find this belt of *Pinus monticola* with sound and perfectly clean trunks and without punk. If you pass through this series of trees you get up into the hemlock tract and above this get to a tree he does not speak of at all, *Picea Engelmanni*. This tree is so useful and so valuable that nearly all the bridges and snowsheds on the Pacific Railway were built with it. I have seen thirteen ties each eight feet long taken out of one tree.

I am not now speaking of the coast forest at all. This is a forest starting at the boundary, latitude 49°, and extending for 770 miles north from 49° to 60°. Understand that the forests of British Columbia are not confined to the coast. The coast is a mere strip; but this central part, which in these mountains is clothed with spruce, extends to latitude 60° and stretches from the Cascades on the west to the Rocky Mountains on the east, so that it is about two to three hundred miles in width.

When you go toward the Peace River country it gets wider. What kind of timber is there in that country? It is solid spruce forest, white spruce and black spruce, almost identical with the trees we have in the East. The forests are so extensive that northern British Columbia is a preserve in connection with the pulp industry beyond the estimate of any of you who have never seen it. Here the black spruce will run to six or seven inches in diameter. As we proceed west they gradually become larger, so that in the Peace River country I have measured some trees three feet in diameter. I want to increase the value of Mr. Anderson's paper by extending it. Mr. Anderson speaks of the coast and I speak of the interior, and I say, just as he says, that British Columbia is timbered beyond the estimate of any individual.

I stood one evening on Mount Arrowsmith 6,000 feet high, and looked out over a beautiful expanse of country. The next day was windy and fires got up, and looking over that enormous forest you could scarcely see any part not covered with smoke. On Vancouver Island where the trees can be burned they are being burned off as quickly as they can be. They can be destroyed in this sense that they cease to grow. They will not be entirely destroyed until there are more fungi there to cause decay. Decay is caused solely by fungi. The fires cannot destroy the northern forest, because they do not get dry enough to burn.

Mr. E. Stewart, Dominion Superintendent of Forestry, then read a paper on 'Forestry on Dominion Lands'.

FORESTRY ON DOMINION LANDS.

E. Stewart, *Dominion Superintendent of Forestry.*

It may be of interest to the members of the Canadian Forestry Association to know what is being done under the supervision of the Forestry Branch of the Department of the Interior.

As it is only a little over a year since this branch was organized, it cannot be expected that very important results have yet been realized. Nevertheless, important steps have been taken in certain directions, while in others plans are now assuming definite shape and the methods proposed will, it is hoped, soon be applied in the field. The area of country over which this branch will operate is so vast and the conditions of climate and production so varied as to make any one set of regulations to apply specifically to the whole area impracticable. If we subtract from the total area of the Dominion the aggregate area of those provinces that control their own land and the forest

thereon, we will have remaining that which is under Dominion control, and it will be found to be about three times as great in extent as the total area of these older provinces. This vast territory embraces: first, the prairie belt of the North-west which contains about one eighth of the total area of Dominion Lands: second, the treeless waste stretching from the northerly limit of tree growth to the shores of the Arctic Ocean, containing an area probably three times as great in extent as that embraced in the prairie section; and third, the wooded or timbered districts; the largest section of these is embraced in the territory lying between the barren lands of the far north and the prairie region and the north boundary of Ontario on the south, and extending from Alaska on the west to Hudson Bay on the east. It should also be noted that the northern and eastern part of the province of Manitoba is generally wooded. Again, we have several belts of timber in other parts of both Manitoba and the Territories, such as the Riding Mountains, the Turtle Mountains, the Moose Mountains, &c., and a large area along the eastern slope of the Rocky Mountains, and further west in British Columbia the Dominion owns and controls a belt of territory forty miles wide by about five hundred miles in length along the Canadian Pacific Railway. This belt contains a large extent of valuable timber. And finally, east of Hudson Bay we have the immense territory known as Labrador, a large part of which is timbered. With reference to the forests on the first mentioned or sub-arctic belt, it may be said that the one variety of tree which is the most abundant there, and which in fact is found more or less in every part of this vast territory, is the one which at the present day, with the exception of the white pine, is being most sought after, as it furnishes the best material for the making of pulp. That is the spruce. The two varieties of this species are found everywhere throughout the whole extent of this territory. In fact spruce may be said to occupy the place in general use and value, in all that territory between the Rocky Mountains and the older provinces, that the white pine did in the older provinces.

FOREST FIRES.

Recognizing the fact that the destruction in the older provinces from forest fires had been simply incalculable, and that the above named districts were being denuded from the same cause, it was deemed that attention to this matter deserved first place, and a system of protection has been adopted, one feature of which is the employment of forest fire rangers. Owing to the latter part of last season in the west being very wet, it was not put in operation to the same extent that it would have been had the drought of the early summer continued. That the employment of fire rangers in the pine districts of the provinces of Ontario and Quebec has been productive of great good is universally attested, and it is believed that a similar service in the timbered lands of the Dominion will have similar results. The system adopted by the Dominion differs, however, in several respects from that in operation in the provinces. It may be briefly stated as follows:—Forest fire rangers are selected from men residing in or near the district where they are to be employed. They are notified that they will be under the direction usually of either the Dominion Lands Agent, the Crown Timber Agent, regular Forest Ranger, or Homestead Inspector for the land agency in which they are employed. When this supervising officer considers their services are required, he notifies them to commence work, furnishes them with a copy of the Fire Act, a copy of general instructions defining their duties, and also with notices for posting up and distributing, warning the public against the careless use of fire. Where horses can be used they are to supply themselves with them. Their remuneration in such case is $3 per day, which includes expenses for both man and horse. When the supervising officer considers it unnecessary for the ranger to continue the work, he recalls him and instructs him to make out his account, and on forwarding the same to the department, certified to by the supervising officer, with a diary detailing how he was employed each day, the account is paid. By this system the ranger is employed only when his services are considered necessary, and in case it is very wet, he may not be employed during the whole season. Where there are timber limits under license within the area guarded, the holders pay a proportionate amount of the cost, but the greater part of the country is still held by

the Crown, and, consequently, the government will bear the larger part of the cost of guarding it. In certain cases where the belts of timber are exposed to fire from the prairie, fire-guards have been constructed skirting the limits of the timber.

TIMBER RESERVES.

A very wise move was made several years ago by which certain areas of timbered land were set apart as timber reserves. One of the most important of these is the Riding Mountain Reserve in Manitoba. It consists of about forty-five townships or a little over 1,000,000 acres, and is the natural reservoir from which a large number of streams receive their supply of water, and it would be impossible to over-estimate the importance to a large section of that province of keeping this tract covered with forest. Another of no less importance has recently been set apart along the eastern slope of the Rocky Mountains and embracing the foothills between the Bow River and the 49th parallel. The importance of retaining this area as a forest is increased by the construction of the irrigation works on the plains to the east of this territory. The only way to retain the usefulness of these works is to keep the natural reservoir from which this water is derived intact, and this can only be done by retaining the forest covering at the sources of supply.

Other timber reserves will probably be set apart from time to time whenever it is considered wise in the public interest to do so.

FOREST TREE PLANTING ON THE PLAINS.

Another feature of the work which is being undertaken by the Forestry Branch is that relating to government assistance to the prairie settlers in the planting of windbreaks, shelter belts, and forest plantations.

This matter has been under consideration for some time, and the various forestry systems of other countries have been studied with a view of working out a plan that would be practical for adoption on our western prairies. It would be an easy matter to copy in full any one of the European systems such as that of France, Belgium or Germany, but to do this and expect it to succeed in our North-west where the climatic conditions are so dissimilar and where the governmental machinery is so different would be just as wise as it would be for us to import all the trees of those countries and expect them to thrive under such entirely different conditions as prevail there.

Several attempts have been made to encourage tree planting on the plains by the United States government and also by that of the Dominion. One of these was what was known as the Forest Tree Culture Claims, by which a certain amount of land was earned from the government by the planting of a certain area in trees. This system can scarcely be said to have been effective. The trees were planted, indifferently in many cases, and if they did not thrive it was difficult to assign the cause, between Providence, the weather and the individual. It was found in too many cases that the latter failed to prepare his soil properly or care for the trees after planting, but claimed that he had done his part and demanded the land for so doing.

In our case the Dominion government has an experimental farm at Brandon for Manitoba, and one at Indian Head for the Territories, which are doing excellent work, and these have furnished large quantities of tree seeds and young trees to settlers for several years, but it is well known that many of these never succeed, largely owing (1) to bad planting, (2) to their being planted in land not sufficiently prepared, and (3) to lack of cultivation and attention after planting by the settlers.

The federal government of the United States has at last adopted a system of co-operation with the settlers that is undoubtedly by far the best that has yet been attempted, and the main features of this system have been utilized in framing a system here, but we propose to go further than they do in that we hope to be able to furnish seeds and plant material.

The system that has been outlined may be stated as follows :—

1. It is proposed that any owner wishing to avail himself of the co-operation of the government in the planting and cultivation of a forest plantation, windbreak or shelter belt, shall make application to the Forestry Branch at Ottawa.

2. On receipt of this, the local supervisor of tree planting for the district in which the property is situated is directed to visit and examine the lay of the land and its quality, any streams on it, the location of the buildings, etc., and in case he thinks trees can be successfully grown on it he will show the position of the proposed plantation, the kind of trees to be grown, their distance apart, etc.

3. This sketch and any other detailed information he may consider necessary will be sent to the head office where a working plan will be prepared, drawn to scale and showing the general features of the farm as compiled from the notes and sketch made by the local supervisor and also the position of the proposed plantation and other necessary information.

4. A copy of this plan along with the agreement will be sent to the owner. He will keep the copy of the plan for his guidance and return the agreement duly executed.

5. According to the terms of the agreement, the owner agrees to prepare the soil for the plantation and to plant and properly care for the same after planting according to the plan under the direction of the said supervisor or agent of the Department of the Interior.

6. The department will, as far as the means at its disposal will permit, furnish seed and plant material for the purpose of planting the said plantation.

7. The department proposes to render all services above specified wholly without charge.

8. The department under the agreement reserves the right to enter and take from the plantation for use elsewhere any young seedlings that may be growing up and which should be removed in the proper management of the location, unless the owner wishes the same to extend his plantation. The same privilege is stipulated for with reference to cuttings and seed.

9. It is also provided that the department shall have the right to publish and distribute the said plan and its results for the information of farmers and others whom it may concern.

I had the pleasure of addressing upwards of twenty meetings in Manitoba and Assiniboia within the past six weeks and laying before the people an outline of the proposed system. These meetings were well attended throughout and the greatest interest was manifested in the subject. In every case on an expression of opinion being asked, resolutions were unanimously adopted in favour of the proposed plan.

It will probably be impossible for the department to arrange to furnish seed or plant material this coming season, but those intending to avail themselves of the proposed co-operation of the department can very properly take one season in getting their ground in a thorough state of cultivation so that they can be ready to plant the following spring.

It will be observed that the two prominent features of the proposed plan are (1) the furnishing of seeds, cuttings and young trees by the government, and (2) government supervision in tree planting and cultivation by the settlers. Now, if this system is generally adopted, to supply the plant material will be a matter of some magnitude, and it is in view of this that clause 8 is inserted in the agreement. This will allow the department the unused product in any plantation for use elsewhere. Suppose, for instance, a certain area on a farm has been planted with box elder seeds. The probability is that double the quantity will come up that should be allowed to grow. Then in a few years those left growing will begin to bear seed. Now this provision permits the department to enter and take these young seedlings and also the seeds for use elsewhere, unless the owner wishes them to extend his own plantation. By this means it is believed that the difficulty in supplying the plant material will be met, for the more plantations we have the greater will be our sources of supply. The greatest difficulty would be for the first few years, but this can probably be overcome by securing a large supply of seeds from different sources and planting more seeds and cuttings than trees during this period. There are other points in favour of this plan. For instance, it will afford us what might be called small nurseries in every locality, and the stock taken from them and used on adjoining or neighbouring plantations, where the climatic conditions are identical and the soil and altitude similar, will be more apt to prove successful

than if moved long distances and from locations where perhaps the conditions were very dissimilar. In addition to this, there is the smaller cost of taking the material from the parent plantation to the new one, as well as the advantage in the case of cuttings and young trees in the decreased time of their exposure.

This brief review of what is being attempted by the Forestry Branch will probably serve to show, if nothing else, the great field for usefulness that lies open before it. The area over which it will operate is of vast extent, and the opportunities afforded it for effective work are very great. Owing to so large a part of the territory being still in the hands of the government, it is obvious that fewer difficulties will arise in carrying out a judicious forestry policy than if large vested interests had been acquired, and it is hoped that these efforts may be worthy the support not only of this Association but of the country as well.

Hon. T. A. BERNIER.—Being from Manitoba myself I have been very much interested in the paper read by Mr. Stewart, especially that part which relates to tree planting in our province and in the North-west. We have not very much tree planting in the West, and I think that the plan just given out by Mr. Stewart will do a great deal towards the realization of this object. I would like that this plan should be adopted as soon as possible, and that the government should keep it up for some time. Of course many difficulties will be met with. Perhaps the settlers will not avail themselves as readily as they should of this plan, but you must take the settlers as they are. You spoke of the neglect of the settlers, but sometimes they are face to face with difficulties that they cannot overcome, but if you stick to your plan for some years and if you make it easy (do not adhere too much to your regulations ; make it easy for every one) I think you will realize good results. As to your plan, may I suggest that it might be well that the settler should not be too much restricted on his own property. I think on the whole that the plan is well conceived. If the government can operate this plan and keep at it for some years, I think they will get some results.

Mr. Wm. Pearce, of Calgary, then read a paper which had been prepared by Mrs. Zina Y. Card, of Cardston, Alberta.

FORESTRY ON THE PRAIRIES.

MRS. ZINA Y. CARD, CARDSTON, ALBERTA.

'The groves were God's first temples', and the deity in man still longs for the wonted places of worship. Forestry where forests are, is one thing, but forests, where nature has not planted trees, is another. It is the problem we of Southern Alberta are interested in. Tree planting has received no attention save the planting of posts to string wire on. The fencing epidemic has passed for the majority of our citizens, and, naturally we are turning our eyes upon the future, and this most encouraging movement for preserving the forests of our great country, and supplying trees where they can do so much good for the inhabitants of the prairies, will bring happiness, beauty, and wealth to us all.

In Utah, where every city, town, and village, is a wilderness of trees, it is not difficult to produce them, for irrigation is an absolute necessity, and canals constructed and owned by the people who need them, furnish the necessary moisture. Irrigation is the key to unlock many of these hidden treasures of great worth held in the bosom of 'Mother Nature.' Trees that are irrigated must have cultivated land for the start of seed, slips or small roots, water must not go direct to the tree, but a margin must be well hilled up, and the water allowed to soak down to the root, and not touch the bark of the tree ; this is a safe method for the watering of them and is usually done in Utah, but the methods used there will not meet our needs here in all cases.

From actual experience in Cardston, Alberta, we have found the native trees the most successful, and in the lower locations no trouble has been experienced in transplanting if they were given the necessary moisture at the time needed.

MR. WILLIAM PEARCE'S GROUNDS NEAR CALGARY.

Evergreens have not been successful, the Manitoba Maple has succeeded when hedged, also Black Willow and Basket Willow in limited quantities. Quoting from Mr. Wm. Pearce in the forestry report: 'That until you get windbreaks it is desirable to confine your exertions in tree planting to the natives. Procure as close as possible to the place where they are to be set out, having the same conditions with regard to exposure, wind, elevation, &c., and there is more success in moving from a higher to a lower elevation than the reverse. Having once provided windbreaks, then if you desire, try the more delicate trees from the east or south.' This is our experience exactly.

Now, as you probably are aware, we have in this part of the country a magnificent canal at our doors, the mountains but a short distance from us, where the native trees can be procured. How shall we interest the settlers, and get this subject before them in such a decided shape as to induce an individual desire to co-operate with the efforts of the organization?

'Success always claims attention', but years must elapse before returns can be realized for profit or beauty in this branch of industry; this brings us to another point, and I will presume to answer my first inquiry by asking another question. What is to hinder the establishing of a tree farm on a small scale in this section of the country?

Climate, soil, water, and native trees are here, with the strong arm of labour to carry out the theories of those who are giving this matter their earnest attention and learned investigation. From opinions expressed by the subscribers for the organ of the Forestry Association, viz.: 'Rod and Gun in Canada' as members of the organization they felt a paper or magazine like the Farming World would meet their needs, and give the information desired for this district of country in a more desirable form than in the present publication.

An effort was made to secure members during the last of the year in order to get the magazine at the beginning of the present year, and plans for spring work, we are suffering for a lack of knowledge and information on this subject, hence the suggestions concerning the organ now officially announced.

Mr. Wm. Pearce.—I think we might emphasize the idea conveyed in the opening portion of this paper, that forestry is not so difficult where trees will naturally grow as it is where the work to be done is to make trees grow where they will not naturally do so; also the suggestion that forestry could be largely assisted by having nurseries near at hand to supply planting material and seeds that might be required. Mr. Stewart would in time get considerable assistance from the extra plants and trees that would be available from woodlots, but it would take some years before that would be available and how should the settlers be encouraged in the meantime? It has occurred to me that for immediate assistance in tree planting in that country, if the government could see its way to the establishment of small nurseries scattered through the country, it would meet the needs of the case to the largest extent. There are, as some of you are aware, already established in the district in question a great many irrigation ditches, and I think those owning the irrigated land would for a small consideration plant out trees, and where you have plenty of water, so far as the propagation of deciduous trees, such as cottonwood and the different branches of the poplar family, is concerned, they can be planted rapidly by ploughing and setting out green poles in the ground. I have on my place thousands of young balsam poplar varying from three to five feet in height. The poles were planted in May, 1899, not quite two years ago. There could be a few such spots as this over the country and they could, I think, be economically established. In addition, through this country there are a large number of springs around which forests could readily be started if fenced in and protected from stock.

Mrs. Card also mentions that evergreens have not been successful. This I cannot very well understand, as evergreens have been very successful with me. I think they must have been unfortunate in the selection of the trees or in transplanting them. I have seen people bringing evergreens from the mountains when the men were bringing down lumber and logs. They were generally carried in the sun for many hours without shelter. At this particular place there are no evergreens within thirty miles suitable for transplanting, so that the conditions would be very unfavourable.

There is one thing in connection with Mr. Stewart's paper I would like to draw attention to. He mentions a reserve in the foothills of the Rocky Mountains from the 49th parallel to the Bow River and speaks of it as being valuable in connection with irrigation. I do not think it should stop at Bow River for the reason that Red Deer River will need to be protected as it will no doubt in time be one of our most valuable streams for irrigation purposes. It will be all required as there are more lands than the supply of water will cover.

I would call attention to the disastrous flood on the North Saskatchewan in August, 1899, when the river rose sixteen feet higher than any previously known record. I have made a study of this flood so far as I could gather it from newspaper reports and men in the country. The reason of it is to my mind perfectly clear. It is that the foothills country has been denuded of its timber and brush, that is, from one cause or another forest fires have cleared off the county so that when the rain came the grades of the hills were steep and the run-off was very rapid. The water came off in two or three days where it would have taken two or three weeks had the hills not been bared. In August, 1899, the Athabasca River rose higher than it was ever known to do before. I think that the reserve should be extended as far north as Athabasca.

Dr. SAUNDERS.—I heartily concur with the suggestions that have been made by Mr. Stewart. It is an advance in meeting the requirements—no doubt extensive—on the part of the settlers. The ideas impressed in the paper are exceedingly good and will, I have no doubt, be attended with considerable success.

Dr. C. A. SCHENCK, Principal of the School of Forestry at Biltmore, North Carolina, was then introduced to the meeting by Mr. Stewart, who expressed the thanks of the association for Dr. Schenck's kindness in attending the meeting and giving the benefit of his experience to the newly-formed Canadian Association. He spoke as follows:—

I feel here very much like a physician who is asked by letter what shall be done in case of sickness. It is very difficult to decide because he does not know his patient. I have been on Canadian soil for twenty-six and a half hours, which I think is hardly sufficient to put me *au fait* in the matter. All the knowledge I have of Canada I take from the dictionary and encyclopædia and reports from the government departments. Canada is certainly in a very much better position than the United States in the forestry question. You can learn from the mistakes that the United States have made. I think that they have produced more mistakes than good, but by mistakes they learn and from their mistakes you can learn also. It is a very advantageous position for Canada that the providential function of government, that of looking ahead into the future, is better understood here than in the United States. I do not think that the position is as bad everywhere as in North Carolina, but on the whole they are very shortsighted in the United States.

The talk of introducing European methods into Canada is fortunately all talk. You cannot introduce them any more than you can introduce Chinese methods. You have to work out here a Canadian forestry system, a system well adapted to the conditions of Canada. Obviously, there must be differences. What holds good for Quebec will not hold good for British Columbia. We find in Canada two specially prominent sides of the forestry question. One is forest maintenance. The other is absolutely different—forest introduction. It is strange that no forest exists on the western plains. The forest is more called for by the people where it plays a more important role. For the government representative the division into two different tasks makes the work exceptionally difficult. Evidently the people in the North-west are not interested in forest preservation and in British Columbia they are not interested in planting. The tasks are entirely different, and to get these two entirely different interests and keep them working together seems to me exceedingly difficult, and Mr. Stewart has pointed out in his report that the forestry question in Canada is twofold. Where forests exist the question is identical with the fire protection system. Where no forest exists, we must induce growth. In the latter case we cannot get timber, but the indirect advantages are better than the direct.

If you had travelled through Europe some two hundred years ago you would not have found any forest rangers through the country. You would have found dense underbrush and a dense growth of trees. From the old descriptions you can learn that they were gigantic trees, something like those in British Columbia, I suppose, where they tell me it is absolutely safe to walk in forests during thunderstorms, because should the lightning strike it takes a whole day to come down, so high are the trees. Throughout Europe in 1700, forestry did not exist in the unsettled districts of the Black Forest, the Harz and Blumenthal. The only forestry was a stock farming forestry. It was impossible to bring out the forest products, and therefore stock was the only forest product which it was possible to put into a movable shape. The fruit was fed to the cattle and hogs and they could transport the product to the lowlands. With the increasing development of the country and the railroads the prices have risen. As soon as stumpage prices rise, it will pay you to practise forestry. Of course, you must look into the future. We know for sure that stumpage prices must rise. We are curtailing our store. The population is increasing. The forest is not able to supply demands any more. Just as has been the case in the last fifty years, the price of stumpage will rise, so that many a thing that does not pay at the present moment we may embark in, as the rise in prices will make the investment remunerative. I think that the government might go into it at a great expense. Why should present taxpayers suffer for the future? We take now the expenses which will be repaid by the future. I think in the matter of forest fires we ought to move. The laws must be enforced. It can be done. It is done abroad. It is done in India. I think it can be done here. Whether at an expense of $6,000 or $60,000 you must guard all these miles of forest from fire. Though you cannot adopt European systems without money and plenty of it, fires can be prevented. We should impress that on the minds of our people and legislators constantly. It is a sure investment, sure to pay. Trees are one of the best investments that the government of any people can make.

In the plains the question is of course entirely different. There fires do not exist because forests do not exist. The idea upon which Mr. Stewart is working, to concentrate the experiments in the central office at Ottawa, seems to me extremely good What was the use of all the tree planting in the United States? Money wasted; no result. Ever since 1876 it has been going on. Nothing practical has been obtained. They did not give the farmer any chance to do well. He had no advice as to how to plant, what species to plant. The farmer wanted to get cheap land. He could obtain 160 acres of land by planting eight acres with trees. He wanted to get 160 acres. This 160 acres in his possession he was anxious to leave and try the experiment over again. In Dakota they are not farmers; they are land speculators. They want to buy and sell at the best possible moment. The object at which the United States government was aiming would have been more successful if the experiments had been concentrated and controlled by persons who knew what they were talking about. I have no experience with it myself, because we have no such planting in North Carolina or in Germany. With us the task is easier, but I must confess that I have made mistakes because I have thought that what was done in Germany could be done in North Carolina. We have to get our eyes open. We must learn from nature. As one German has said: 'Ask the trees how they want to be raised.' To give the farmers the proper plant material seems to me of the utmost importance, because these little seedlings have to struggle against adverse conditions. Nature had a long time to establish trees on the plains, and nature would have done so, because trees will force their way in everywhere, if it had been an easy task. Strong plants, well-developed plants we must have, because they have to struggle for their life in early youth. The farmer cannot furnish them. I think it would be a good thing to have a government nursery for the supply, because raising plants in a well-managed nursery decreases the cost very much. We find it at Biltmore and abroad that doing a thing on a large scale, having one man responsible for it, you get good plants, strong plants and those best adapted. The experiments will be concentrated and controlled. You will soon know from them what is the proper way to proceed. The idea of using plant material from farms is very good, but plants from the nursery are better. They are better taken from the nursery than

from a place where they are planted too thickly. When taking them out also, unless the soil is very loose, you cannot take them out of these places without leaving their root fibres, and to have the soil in proper condition is only possible in the nursery.

Mr. SOUTHWORTH.—Would it not be better always to take these plants from the nursery than from the farmers' plantations?

Dr. SCHENCK.—I think so. Of course transportation will affect the matter. The shipping of plants may be expensive. On the whole it seems to me a better scheme.

Mr. STEWART.—The Experimental Farms will furnish material as far as possible. Clause 8 was inserted in the agreement so that we would have the privilege of taking this surplus product. The important feature of the scheme is the supervision. Without supervision I think it is useless to furnish trees. Mr. McKay, superintendent of the Experimental Farm at Indian Head, says that the number of trees sent out from there is very large, but on account of the want of attention the results are very small. We will not furnish plant material until superintendence is provided for. The meetings which were held in Manitoba and the Territories at which I explained this plan were very well attended and a live interest was taken. We have no doubt at all that it is going to tax the energies of the government to carry it out.

Dr. SAUNDERS.—Our experience on the farms at Brandon and Indian Head is that we cannot get enough material to keep up the supply. We have distributed in twelve years eight tons of seeds and 560,000 young trees. I quite agree with what Mr. Stewart says that the people do not know how to grow them, but the seeds have been distributed and here and there throughout the country you will find groves of Manitoba maple that have been satisfactory. I have had photographs of the results from packages of seed sent out eight or nine years ago. A single package of seed has transformed a farm from a bare place to a sheltered homestead. I think trees will make a man attached to the country. I think nothing attaches a man to the country more than a pleasant home, and these trees are like so many links binding him to the spot and helping to make better settlers and give them greater pleasure.

Hon. T. A. BERNIER.—The Manitoba maple is a common tree in Manitoba, but I might be allowed to suggest that you should look for other trees. It grows quickly and is a fairly good tree for ornamental purposes but is no good for anything else, not even for firewood. You cannot use this tree in builders' or carpenters' work. It would be well to have other trees so that their cultivation would be good for other purposes as well as the ornamental.

Mr. STEWART.—The Manitoba maple is only a pioneer tree to be used in introducing others.

Dr. SAUNDERS.—We have three hundred varieties under test at both the Experimental Farms in the west.

Professor MACOUN.—Mr. Stewart said that the government had set apart reserves for the preservation of water. Now right in the centre of the arid area are the Cypress Hills stretching for 160 miles east and west, and from twenty to forty miles wide, and these hills have at least half a thousand perennial streams flowing from them. Not one attempt has ever been made by the government or private individuals to preserve one particle of the water, and this is in the centre of the arid belt. And this is not all; but on the eastern slope of these hills twenty-five years ago the police cut down trees 1½ feet in diameter, spruce trees, to build the Post, the East End Post, and all along the slope of these hills the Half-breeds lived year in and year out and hunted the Buffalo. Many young trees exist to-day and all the springs. Now, why should not these perennial springs be preserved for plantation purposes, and from these nuclei the whole country would soon become watered and better clothed with trees and would have a better rainfall. These hills were not always bare, and yet this matter is not spoken of. It is the duty of the government to conserve this water. On the west side there is a big lake, five or six miles long, that receives all the waters from the western slope and a dam across that would give sufficient for the irrigation of the country in that vicinity. This could be utilized for grain and for trees. The main thing is to conserve the water by making small dams. We want the water and we cannot have it unless we preserve it. I think that a whole series should be made around the Cypress Hills and as a result we will have the arid country covered with trees and farms.

Mr. STEWART.—I did not have an opportunity of visiting that district while I was in the West, but I may say that the intention is to make a reserve there after an examination. There is no use of taking up land and then allowing settlers in. We want to make the reserve final. In regard to the forest reserves I may say that I think they should be set apart by Act of Parliament.

Professor GOODWIN.—With regard to nursery stock, there is one thing I would like to ask Dr. Schenck about. I planted some time ago some twenty small pines about five feet high. They were native pines which I had removed myself with some assistance a distance of about two miles. Of these twenty pines I have now sixteen growing, but at the same time I planted twenty trees of various kinds, some pines and some firs, taken from the nursery. They were small, only about 18 inches and two feet high. Of these I only succeeded in preserving some six. What struck me was that the trees taken from the nursery, although growing in loose soil and well provided with root fibres, were not so well suited for the unprepared soil as the others I took from the place where they grew naturally.

Dr. SCHENCK.—Perhaps the large trees were taken with the fibres attached and so the shock was not so great as in the nursery pines, but as I do not know the exact circumstances surrounding the experiment it is difficult to attempt to explain. Possibly the nursery stock was not in good condition.

In regard to *Acer negundo* we want to learn from nature. It would not do to plant black walnut in the west. You can imitate nature. You can use trees that grow easily naturally. These trees could be used as ushers for other varieties.

The meeting adjourned at one o'clock and on resuming at half past two a paper on 'Timber Lands in New Brunswick owned by the Crown,' prepared by Mr. W. P. Flewelling, Deputy Surveyor General for New Brunswick, was read.

TIMBER LANDS IN NEW BRUNSWICK OWNED BY THE CROWN.

W. P. Flewelling, Deputy Surveyor General of New Brunswick.

The province of New Brunswick contains in round numbers 17,500,000 acres. Of this quantity some 10,000,000 acres have been disposed of, leaving still controlled by the government of New Brunswick about 7,500,000 acres, the greater portion of which may be considered 'timber lands.'

Timber licenses are now held on about 6,000,000 acres of this land. The balance of Crown lands, not under license, is in the very interior of the province, and might almost be denominated the forest primeval.

Attached hereto is a copy of the timber license issued by the Crown Land Department, which gives the regulations regarding the cutting of lumber from Crown lands, as well as the mileage and stumpage to be paid.

Formerly timber licenses on Crown lands in New Brunswick were given for but one year. These were sold at public auction, and the mileage received was all that the licensee had to pay and he was privileged to cut anything he saw fit. Later a system of three years' licenses was adopted, with a charge for stumpage on any lumber cut, in addition to the mileage, the license being first sold at public auction to the highest bidder and then made renewable for two years on payment of an annual fixed fee of $4.00 per mile.

This system did not seem to give as good results as were desired, and it was determined to try another.

With the short leases an operator did not care to risk spending any large amount in the improvement of streams and in building good camps, dams, etc., and there was

no inducement for him to preserve the timber, but his only desire was to get as much off as possible while he held the lease.

Limits of Hon. E. Hutchison, New Brunswick.

In 1893 the regulations, as embodied in the attached license, were adopted.

It was claimed that the long lease of twenty-five years would lead to the licensee's cutting the lumber with greater care, that he would have an inducement to expend larger sums in permanent improvements to streams, dams and camps and also that the long lease would enable him to command more capital for his business. The experience of about seven years under this lease has evidently given satisfaction, as persons holding licenses in 1893 are still renewing them, and very little ground is dropped, and that only where forest fires have made it of little value.

At the general sale in 1893, licenses to the number of 1,072, containing 4,161½ square miles, were sold, on which mileage to the amount of $72,634.50 was paid.

During the same year, under new applications made after that sale, 315 more licenses were issued, covering 1,511½ square miles, on which the Crown Land Department received for mileage $16,976.50. These licenses have been renewed from year to year and new holdings have been taken, and at present writing about 9,300 square miles are held under license.

By reference to the regulations it will be seen that the upset price on all new ground applied for is $8.00 per square mile. This amount must be deposited with the application. The license is then advertised for sale and disposed of to the highest bidder. Should another than the applicant become the purchaser, the amount deposited by the applicant is returned to him. The conditions of the license being complied with, on the first day of August in each year, the licensee may renew his holdings on payment of $4.00 per square mile for such portions of his licenses as he may wish to retain, each license wanted, however, to be renewed in full or entirely dropped, not divided.

An applicant may apply for as much ground as he desires, but any one application must not exceed 10 square miles, and no application is reckoned at less than two square miles.

In most localities the timber lands are laid out in blocks 2½ miles square, but in some places 5 miles square, the former containing 6 square miles and the latter 24 square miles, with the lines in most cases running true north and south or east and west. Quarters or halves of these blocks may be applied for.

The Department of Crown Lands establishes base lines in each locality, or in the case of the 24 square mile blocks runs the external lines. For subdivision the licensee is at the expense of survey, the surveyor receiving his orders and directions from the department and making a return of his survey to the department, where a record of all block lines run is kept.

Section 16 provides for the increasing of mileage and stumpage during the term of lease, after due notice of such proposed increase.

In order to prevent indiscriminate cutting of spruce and pine, section 19 provides that no tree shall be cut which will not make a log ten inches at the top, eighteen feet up. In the present great demand for pulpwood, many private owners allow the cutting of spruce down to four and five inches in diameter, but this the department guards against by the above section.

The growth of spruce in most parts of New Brunswick is very rapid, and a five or six inch spruce will grow to make a merchantable log in a very few years.

One of the largest operators in New Brunswick told the writer that he knew from personal observation 'that a spruce tree would grow from the bud large enough to make a merchantable log in thirty years.' This, however, would no doubt be an exceptional case.

The quantity of good pine left on Crown lands in this province is comparatively small.

At the present rate of cutting from Crown lands of from 80 to 100 millions of superficial feet per year, the spruce supply will continue for a very long time in the future.

Many large holders of licenses cut their limits very judiciously, though others are not so particular. Lands will be laid off in strips of 1¼ or 1½ miles wide and from 5 to 10 miles long; one strip will be cut over one year, taking all the merchantable logs. The next year the adjoining strip will be operated on, and so on, for five, six or seven years, when the parties can be sent back to the strip first cut over, and find that the growth has been so rapid that another good operation may be had.

To prevent holding lands for speculative purposes, section 20 provides that a certain quantity shall be cut annually or a certain amount of cash paid in lieu thereof, at the option of the surveyor general.

Licenses given by the department are transferable, subject to the approval of the surveyor general.

The licenses, being for 25 years, are often given as security to banks and monetary institutions for advances made, which, to the licensee, is one of the advantages of a long lease.

As mentioned above, the annual cut of spruce and pine logs from Crown lands is from 80 to 100 millions of superficial feet.

Operators generally have large storehouses in the woods and haul in enough supplies before the snow is gone in the spring to do their crews for the following autumn and early winter. Crews are sent into the woods as early as September and October to repair camps, cut roads, etc., and to chop down the logs and sometimes haul them on bare ground to the different 'yards.' So soon as sufficient snow comes to make good hauling, the logs from the 'yards' are hauled to the 'brow.' These 'brows' are located on the banks of drivable streams, and when the ice runs out of the streams in the spring the crews are ready in the woods to roll the logs from the brows into the water and follow them down stream to the booms or mills.

On most streams the first run of high water is generally taken advantage of. In some localities, the operations being at the heads of long rivers, it takes two seasons to get the logs to mill, but such localities are not numerous.

The principal operations on Crown lands are in spruce, pine and cedar. Some white birch is cut for spool wood, but as a rule little is done in hardwoods such as birch, beech and maple. Large hardwood tracts exist, and in the future must prove of great value. Hemlock is not so extensively cut as it was eight or ten years ago.

For the last ten or fifteen years forest fires have been comparatively rare, and not much loss of lumber has been sustained by reason thereof

New Brunswick has suffered largely in the past from this cause, and some of the tracts burned over fifty or more years ago are only now becoming of any value again, but the Department of Crown Lands has had very stringent laws passed regarding the making of camp fires by fishing and hunting parties and also by settlers in clearing lands, which have had good effect.

In the months of May and June and again in September and October, if dry weather, Fire Wardens are kept cruising through the woods to prevent the starting and to stop the spread of fires.

The licensees also take precautionary measures along the same lines.

The matter of cutting under-sized spruce and the matter of prevention of forest fires, are two subjects which should have study and attention.

Spruce is becoming more valuable, and in some of the nearby states and provinces is being cut beyond its growth, and the supply does not equal the demand, so that many outside capitalists are looking to New Brunswick for a chance to invest in this lumber. Having an abundant supply at present, the province should see that its wealth in that particular is well guarded, both from the indiscriminate use of the woodman's axe and from destruction by fire, started possibly by some careless fisherman or hunter.

Professor GOODWIN,—As one who was brought up in the spruce forests of New Brunswick, I may be permitted to say a few words. Mr. Flewelling refers to the western part of New Brunswick. In the eastern part the forests are largely in the hands of private owners, and I may say from the experience of a good many years, having visited it every summer, that any laws there may be in regard to stopping fires are largely inoperative. Fires are set freely and there is no organized attempt to stop forest fires when once started. It goes on till it burns out. I know from my own knowledge that very extensive injury has been done to the spruce along the line of the railway. The cutting on private lands is in most cases far from judicious. The principle on which the cutting is carried out is to take everything off the land as quickly as possible. They have something I have not seen in Ontario, a kind of mill that they call a portable mill. They carry these around everywhere and saw the logs on the spot. These portable mills leave heaps of slabs and sawdust, largely slabs, which form a magnificent bed for fire. I have seen myself areas cleared of spruce, the cutting of which was done down to logs that were about eight inches in the butt.

Logging in New Brunswick.

Hon. Mr. EMMERSON,—As a native of New Brunswick and having much to do with the management of its public affairs, I must dissent from some of the remarks of the gentleman who has just taken his seat. It is quite true that in many sections of the province, small holders, men owning one or two hundred acres of land, part of which is cleared and part still containing growing timber, frequently take in these portable mills and injury is done not merely to their own lands but also to adjoining holders. It will be borne in mind, however, that these properties are not adjacent to the timber areas of the province. Speaking of the county of Westmoreland, there are several large holders there who take the greatest possible care of their property. They have it protected in

every possible way, and to-day it is many times more valuable than it was ten or twelve years ago. In the county of Albert a property which sold some time ago for $20,000, a few years later, after having been continuously operated, sold for $40,000, and I think the present owner holds it at $80,000. I refer to the Point Wolf property. I could refer to many such properties continuously operated which are very much more valuable and productive than they were ten or twelve years ago. It is true you cannot have an organized attempt to prevent forest fires. You cannot get an army of men there, but the government have it so arranged that the officers are all fire wardens having large powers to take such steps as they may think necessary for the prevention of damage, and yet when any extensive fire does occur there cannot be any possible means devised to have a very large number of men to prevent the damage. The circumstances prevent effective steps. Legislation is one thing. You can make provisions, but it is somewhat difficult to have them carried out. It seems to me that the paper read is an admirable statement of the conditions in New Brunswick, and I am sure that while there is every effort made by the licensees and government to prevent damage from fire, I think it can be fairly said that to-day in New Brunswick, there is very little damage arising to the forests from this cause. I think the condition is satisfactory. I think that, taking into consideration their remoteness from settlement, we have been very successful in preventing damage.

Mr. WM. LITTLE.—I wish to read a quotation from the report by Professor Chas. S. Sargent, of the United States government, on the forest trees of North America, wherein he says in treating of the subject of forest fires: 'The condition of the forests of Maine is interesting. They show that forest preservation is perfectly practicable in the Atlantic region at least when the importance of the forest to the community is permanent. The very existence of the state depended on the maintenance of the forest. The great forests of pine could not be restored, but the preservation of the few remnants of these forests was not impossible. Fires do not consume forests upon which the whole country is dependent for support, and methods for the continuance of such forests are soon found readily put into execution. The forests of Maine, once considered practically exhausted, still yield largely and continuously, and the public sentiment which has made possible their protection is the one hopeful symptom in the whole country that a change of feeling in regard to forest property is gradually taking place. The experience of Maine shows that where climatic conditions are favourable to forest growth, the remnants of the original forest can be preserved and new forests created, as soon as the entire community finds forest protection essential to its material prosperity.' The prevention of fire is very important and I want to impress our people with the idea that we can do something.

Mr. John Bertram was then called upon to read a paper on 'The Economic Management of Pine Forests.' Prefacing his paper Mr. Bertram said:

'I was very much pleased to have the opportunity of hearing Dr. Schenck speak on forestry. He is one of the men on the continent with a knowledge of scientific forestry. He obtained his knowledge of it in Germany. I was glad to find that an educated forester like Dr. Schenck comes to the same conclusion in regard to the forest that we have done, simply trusting to our own observations. Dr. Schenck has said that the policies in vogue in Europe are not possible here; we must examine for ourselves and found our policy on what we learn. When I first decided to look into the question of forestry I thought of buying some books on the subject, but I finally came to the conclusion that it would be better to go directly into the forest and study the matter at first hand. I have not read a single book on forestry. I thought they might bias my opinions, and I went into the forest with my eyes open and used them to see what I could find out. My observations are the result which I have reached while pursuing my calling of cutting down trees.'

THE ECONOMIC MANAGEMENT OF PINE FORESTS.

Mr. John Bertram, Toronto.

The observations in this paper are confined to the growth and reproduction of White and Red Pine in Ontario. The early settlers in this province and, it may be added, of North America were little concerned with the economic problems of Forestry; their main object was of necessity to clear away enough of the forest to permit them to grow food for their families. So vast was the forest that an indiscriminate war was waged with axe and fire against all forest growth and many localities were stripped bare where the trees should have been preserved and the forest continued.

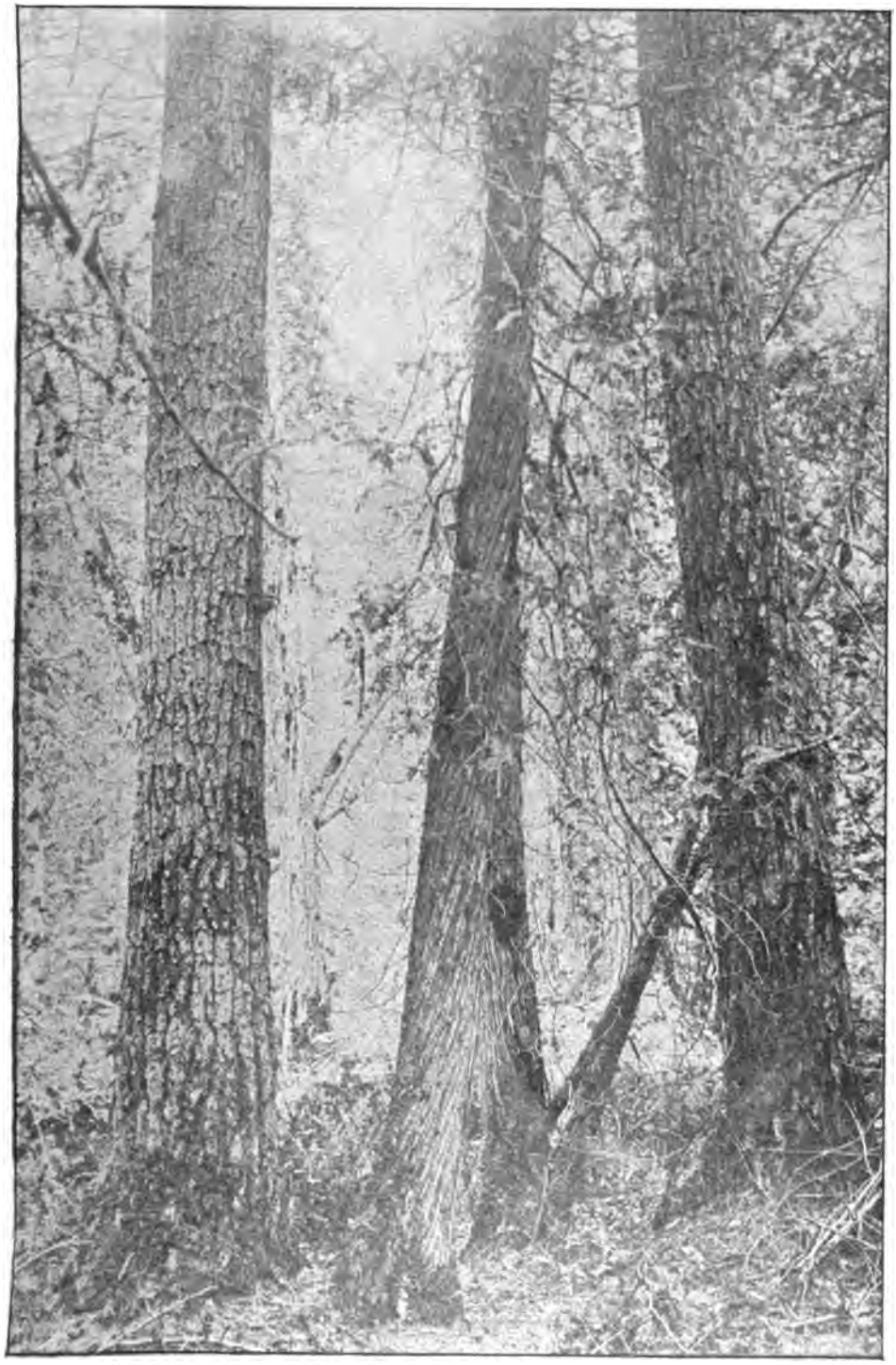
Southern Ontario is second to no country in the world for richness of soil and salubrity of climate, it was covered by a thick stand of timber, and if the first settlers had been gifted with sufficient foresight, they never would have cut down the timber in many corners and parts of their farms. There are very few localities in Ontario south of the Laurentian Range where it would have been more profitable to have retained the original forest; a very large percentage of the soil is better employed growing roots, grass and cereals, but when this is admitted, it is also true that there are many localities, such as hilltops and sides, ridges, gullies, the banks and sources of streams, gravel banks, sand hills, and rough broken land generally, that would give a much better return by growing timber rather than grain, and the sooner this is understood and appreciated, the better for the owners of the land. It is not within the compass of this paper to speak of the great benefits accruing to any country where a fair proportion of the area is kept under forest management. That they are great is now universally conceded.

So far as white and red pine are concerned the southern part of Ontario need not be considered, except that they would be desirable trees for reforesting the poorer soils. There was a considerable quantity of excellent pine which grew as a rule amongst the hardwood and sufficient of it is left as second growth to re-seed any locality considered desirable.

It is now with a different region entirely that the future of pine timber in Ontario is bound up. There is a vast area, nearly a thousand miles from east to west, running through the province and which may be considered the true home of the white pine, not that it there reaches its best growth but that it is economically the most valuable; this part of the province commences a short distance north-west of Ottawa on the north, not far from Kingston on the south, and away north westward around Georgian Bay and Lake Superior to Rat Portage overlapping the height of land between the St. Lawrence and Hudson Bay waters. Large bodies of pine grew in this district. Most of the original pine forest has already been cut down, and, sad to relate, fire has devastated a considerable portion of it and burned untold value in young trees. There is little or no pine in the forest which still stands north and north-east of Lake Superior, spruce of moderate size is the prevailing tree. There is no climatic reason why pine should not again grow in this essentially rocky country, as there are detached bodies of pine standing north of the watershed in the region between the 48th and 49th parallels. The question which presents itself with reference to this region from a practical and economic standpoint is what policy should be pursued to obtain the best results with the least expenditure; it is by no means an easy one, and is almost as varied as the aspect of forests in different localities, each type would require a close examination as it appears before the lumberman or settler commences operations.

It is to be assumed that the lumberman under government supervision is desirous not only of marketing the present crop, but also of perpetuating the growth of the most valuable species. So looking at the whole matter in the light of experience and remembering that operators in Canada are debarred from the expensive methods in vogue in thickly inhabited countries, where every tree top, branch, and even twig has value, the following views for forest management are offered for your consideration.

1st. A very common variety of forest to be found, particularly in parts of Algoma, is where white pine was the predominant wood, but well mixed with other kinds. A fire



FOREST IN NORTHERN ONTARIO.

occurred, it may be ten, twenty or thirty years previous to the condition now being considered; it burned all the timber except some large pine trees left in groups or scattered here and there, as circumstances may have favoured their escape. After the fire the usual seeding commences, poplar and white birch making their appearance first, by reason of their producing annually a large quantity of seed, which from its structure can be carried great distances and as it grows quickly the ground is soon covered with young trees. The pine tree does not seed as a rule oftener than every third or fourth year, (Mr. Bertram here remarked that according to his observation 1897 was the last full seed year) so that poplar and birch have time to make a good start, the poplar particularly grows very fast for a few years after making its appearance; so when the seed from the old pine tree left standing begins to scatter it finds an ideal condition for germination. This order of nature is exactly what is needed to produce a pine forest of commercial value. Pine seed will not germinate under a thick canopy, it needs sunlight and also the proximity of other young trees, causing it to shoot upwards, instaed of growing into a bush as it would in the open. Growing up amongst the poplar and birch it gradually loses its under branches and by and by overtops and dominates all the other trees, becoming the monarch of the forest. At a period then when the bush is thus covered with second growth and the old trees still standing, the course to be pursued presents no difficulties. Market the old timber when convenient and rigorously preserve the young timber against fire. When pine trees are in the earlier stages of growth a fire is most disastrous, they are easily killed, and the old trees having been cut down there would be no chance of re-seeding, and so at this stage fire would be a real forest calamity.

2nd. A type of forest often presents itself composed mainly of pine, but mixed with other conifers and a sprinkling of hardwood. The pine may be divided into two or three groups of different ages, it has killed out any deciduous trees that may have been mixed with it, except in spots here and there where the pine did not seed. Hemlock, spruce and balsam being shade-enduring trees are often found struggling for life beneath the pine, but so long as pine is the dominant tree the others will make poor growth. If there are any large hemlocks or spruce they should be cut down and marketed as they will only prevent pine from growing in their place.

And now as to cutting the pine, no tree should be cut down unless it measures at least twelve inches in diameter two feet from the ground, it is worth more standing, unless it may be that it is one of a group growing too close together, when the woodman's craft should be exercised in selecting which of the group should be cut down, relieving the others from the pressure of its presence. It would not be good forestry to cut down all the trees that would make a ten inch butt log; thinning may be an advantage, but at that stage, where favourably situated, they are too valuable for further growth. Care should be taken generally to preserve the canopy of the forest, while at the same time admitting enough sunlight for the growth of seedlings, they may be seen growing up in a young forest twenty or thirty feet high in the place where large old trees have been cut down, the requisite sunlight having been thus admitted. In this description of forest all the large old trees and most of medium age can profitably be cut, leaving the younger timber room to grow, and this treatment, by reason of accelerating the growth of the young timber left, would increase rather than retard the annual amount grown per acre. Instruction should be given to the woodsmen on no account to cut down a young pine except where making draw-roads or clearing for skidways. The practice of suing young pine to make crossways, bridges or skidways, or even to put up buildings, should be strictly prohibited, just as the cutting down of all varieties not wanted should be encouraged. A little care would produce a valuable second crop for the owner, but it would be all thrown away unless fire was kept out, as it would be particularly destructive to this class of forest.

3rd. A forest composed mainly of hardwood mixed with large pine trees may now be considered; except yellow birch the hardwood is seldom very valuable for lumber in our northern country, and often too far away from a railway to make cordwood. Pine amongst hardwood is very valuable for square timber and is much sought after; it has no chance for reproduction, as the seed disseminated will not grow under the shade of

the hardwood, so when the pines are cut down the forest reverts to a hardwood of very little value. When the locality and soil are more fitted to grow pine, it is simply valuable space lost. To say that white pine seed will not germinate in a hardwood forest is not strictly true. The young trees may often be noticed very small, very sickly-looking, and examination of many specimens shows that it will take twenty or thirty, or even forty years, to grow one inch in diameter, the stunted tree finally dying for want of sunlight. A young pine tree refuses to live under the close canopy of a thick hardwood forest. Two things are necessary to reproduce pine in a forest of this kind; first of all, all defective pine trees not valuable for lumber, and there is always a proportion of them should be strictly preserved and guarded. All the trees in a high or exposed situations where the seed would have a chance of being carried long distances and over a wide area should be left standing; and, second, it will depend upon the locality and on the kind of hardwood, but as much of it should be cut down as possible, not making a clearing, but taking all the large trees and leaving where possible the small ones as a shade for the young pine to grow up amongst. No arbitrary rule can be set, the owner will have full scope for all his acumen and individuality in producing the best results. Constant care and attention would be needed, and it should ever be remembered that sylviculture is a slow process. Seed cannot be sown one year and reaped the next; this leads up to the question of ownership and fixity of tenure, which is a necessity for all operations extending over a long period of time.

4th. An entirely different method would have to be pursued in the case of a forest where the timber is all within, say fifteen or twenty years, of being the same age; the bulk of the trees being large, but mixed with a good many of smaller diameter; twenty years is a short time in the life of a pine tree and the different diameters arise through the large trees existing under more favourable circumstances. With more space and sunlight they have overshadowed the others, and although the small trees may be nearly the same age and height, they may not be more than one-half or one-third the diameter, and if the large trees were cut down taking away the shelter from the long, slender trees they would inevitably blow down. The custom amongst lumbermen operating in a forest of this kind has been to cut down every tree, and the policy was sound enough; but if the object is to keep the bush in timber then it would become necessary to cut only within certain defined areas, leaving enough standing as the original forest to re-seed the cut over spaces. The selections would have to be made on good forestry principles; the timber would have to be left on hill tops and ridges so that the seed could distribute itself over a wide field; if the country were comparatively level then alternate blocks should be selected, not necessarily of any given space or size, but taking advantage of the inequalities of the ground and thickness and position of the standing timber. No exact formula can be indicated, as no two sections of the country are alike; each locality would have to be considered by itself and good judgment exercised in what to cut and what to leave, making sure only that enough is left to fairly cover the ground with seed.

5th. A large number of broad and prevalent types of forest could be cited, but enough has probably been said about what the course of procedure should be in the economic administration of forest lands. Another example only will be given where hemlock, spruce and balsam are the prevailing trees, mixed, it may be, with some hardwood and a moderate quantity of pine; to increase the quantity of valuable trees and eliminate the others is somewhat difficult; whatever distribution of pine seed there may be from time to time it has little chance to come up where the ground is covered by other conifers. Their seed is all more or less shade-enduring and will germinate and grow up where small pine would be smothered. The conclusion reached in considering this example is that the much dreaded fire would here be a friend and not an enemy. Keeping in mind always that it is a growth of pine that is wanted, a careful survey should be made of this forest and the sections where pine exists and under favourable conditions for the distribution of seed should be marked off and a space cleared around them over which a fire could not go; all or a portion of the large pine, as the case may be, cut and also all the hemlock and spruce of market value and fire set to the balance on a favourable opportunity. Fire over a district, if not so fierce as to kill all the

timber, is not much to be dreaded, it is the second and recurring fires killing the young trees which may have sprouted and burning the soil, which is most to be dreaded. A fire that kills the useless trees and burns up the old needles and débris of the forest, leaving the large timber, is often a great benefit, as it brings the ground into a fit condition for receiving seed, and young trees will grow much faster than where overshadowed by an old forest. There is, and can be, no set formula in these matters, but much room for the exercise of observation and good judgment.

These questions of forest treatment have all been considered from an economic standpoint, and as entirely within the scope of the owners of forest land in Ontario, no great expense needing to be incurred and no looking forward for a hundred years to obtain returns being necessary. A set of rules could easily be framed to govern all licenses, that, while not depriving the licensees of anything of value, would at the same time preserve for the province a very valuable asset in young timber, dues for which would be collected in after years.

Much has been said and written on the annual growth of young trees, but as that matter was dealt with recently in the preliminary report of the Ontario Forest Commission, it need not be gone over now. One thing, however, may be said, that in a preserved pine forest a crop may be gathered every twenty years, more or less, without reducing the total growth of the forest per annum.

And now to conclude with the most difficult question of all:—What can be done with those areas of land burned over again and again? Many of them can be seen from the windows of the railway car passing up the beautiful valley of the Ottawa River. They are evidence of the carelessness that should be amended as soon as possible; left alone they are a disgrace to the country. We are not the only sinners on the continent; the great State of Michigan is to-day earnestly engaged in an endeavour to re-forest some three or four million acres of mostly abandoned lands within the state.

When the regrowth of pine on such lands is spoken of the idea is often met with unbounded jocularity, and the only question in the mind of the listener is what particular asylum the speaker should be sent to. In imagination a gang of men are seen putting in seedling trees much as young cabbage are planted; why it would cost millions upon millions, and the whole matter is dismissed with a laugh; nevertheless the question is up for solution.

Covered again with forest these desolate areas would be of incalculable benefit to the country, and when the people fairly grasp its significance they will see that the government take proper measures to reclothe our bare hills and desolate valleys.

It is not here pretended that a full solution has been found, much thought and study will be needed, men of practical minds and experience will be found to undertake the work, and a beginning can be made now.

It can be seen that on some of the burnt over districts a quantity of young pine has been left standing here and there, they should be guarded as a nucleus for future seed distribution and, keeping away fire, nature will do the rest.

There are localities, however, where fire after fire has swept over the country until not a single tree is left, this is the case often near settlements. Carelessness and worse have produced the inevitable results, and it will be with much labour and difficulty that favourable conditions can again be attained. Individual planting over wide areas is in this country out of the question, and the only alternative that would seem to be left is to carefully select small patches, so situated as to effectually cover the country with seed and by the inexpensive process of putting some seed in the ground, raise clumps of trees of the desired species that would by-and-by reproduce themselves.

At the age of from 25 to 30 years, more or less, young pine would commence to bear cones and scatter seed; just how far seed will fly depends on many circumstances, but from observations made in burnt districts, which have been re-seeded by solitary trees, and also noticing seed floating in the water, there seems little doubt but that the seed of conifers will distribute itself anywhere from the vicinity of the parent tree to a mile, or even more. Cones open in the fall when storms prevail, and no doubt the seed is detached very often during a violent wind, and from the vantage ground of the high tree top and with the beautiful sail attached to the kernel, will fly great distances in

stormy weather. Sufficient time being allowed the reforesting of burnt over districts presents no economic difficulty, it is the ordinary process that takes place in a longer or shorter time in all forest countries, what is really needed by man's interference is to shorten the period of non-production and to assist nature to give us the varieties most wanted. The length of this paper leaves no time to speak of the benefits to be derived by having bleak barren wastes again covered with forest verdure. Neither can anything be said about the desirability of again causing white pine to grow in that very interesting region around the north shore of Lake Superior; that it can be done is proven by the evidences of pine growth north of the watershed; it would be an interesting pastime for some member of the Association, with leisure on his hands, to devote some time and thought in demonstrating how pine can be made to take the place of the less valuable spruce in that most interesting region; and it is to be hoped that the zealous Inspector of Forestry will be able to induce some one to undertake the work.

Dr. SCHENCK.—The scientific forester put before the actual question has done what the lumberman does. Mr. Pinchot has done very slow, conservative cutting on the lands owned by Dr. Webb and Mr. Whitney, comprising about 40,000 acres. There are white pine, spruce, beech and birch. Mr. Pinchot removes spruce that will scale ten inches and over in diameter. It is nothing but what the lumberman does. While this man is a scientific forester he does what the lumberman does. As soon as you put them to the practical test they will do exactly what the practical man will do if he is put to the test. The tract owned by Dr. Webb is in a particularly advantageous position. The railroad which runs through it is owned by him. He has his game wardens, and he has a fire guard with each train and with each of the trains there is a tank of water. If a fire is started it can easily be stopped. If he could not guard his forest from fire, I think it would be unwise to leave anything on the tract. Suppose you have a livery stable and a fire occurs, you will get your horses out as quickly as possible. Many a lumberman in the United States is in the same position. He takes the lumber out and converts it into money. In the United States the tracts owned by the lumbermen are very small. No wonder that they have found the solution in cutting everything. The larger the tract sold to the lumberman the better. At Biltmore we have 110,000 acres, a large property. but it is extremely difficult to keep out the fire. Here in your climate for a large portion of the year the snow covers the ground and should make the task less difficult. To have fire protection when there is drought is a good arrangement.

W. N. HUTT.—Through the older part of the province of Ontario it looks very much as if we were coming to the condition of Manitoba. Have we not gone too far? It seems to me that our climate is changed in the last few years owing to the cutting off of the forests. We have excessive storms of wind, and storms of lightning are much more severe and numerous than they used to be. Creeks never known to dry before are now dry, even what we supposed to be spring creeks. It seems that it is largely due to the cutting off of the trees. In the county of Elgin I saw whole tracts along the lake that were simply sand dunes blowing around with nothing to hold them. They were covered with trees previously, and now the sand drifting over the arable land is spoiling it also. At every railway station you can see trees to be shipped, logs of all kinds. I think this is particularly the case with the elm of late years. Elm was not worth anything at one time, but of late years it has become valuable timber for various uses in the arts, and some of the farmers have been cutting off their trees and the percentage of wood has run down to a great extent. I think that the floods on the Grand River are simply due to the cutting of all the trees at the headwaters. Even farmers' wood-lots are being cut off. The farmers think that wood-lots are not capable of proper management. They do not believe that the wood-lots are capable of producing any returns. Whenever it has been mentioned at the meetings of the Farmers' Institutes it seems a new subject to them. It seems to me that this association could do a great deal on these lines, because the farmers seem very anxious to know more about this subject, and it seems to me if the practical principles of forestry were set down so that they knew how to keep the seed and start a forest grove, it would do a great deal

towards checking the cutting of woods. I would recommend that this association take some action in this matter. I think that a report from this association should be issued and distributed, and in that way the information will be brought to the people of Ontario. We would thus do much for the trees of Ontario.

Mr. WM. LITTLE.—Mr. Bertram tells what I assure you is true, that the country he spoke of, the western part of Ontario, was a well wooded country at one time, about the time I was born, and this will give you an idea. Here is a letter I picked up the other day, dated Thorold, April 12, 1826, written by my grandfather to his brother in London. He talks of the beauties of the trees and climate, particularly of the pines. He says: 'There is a gentleman within gunshot of my place, Mr. Keefer, to whom I was recommended. He lives on the other side of the canal. My farm is the best wooded farm of any about me. There are some fine pine trees 120 feet long, and they will square from twenty to thirty inches for half the length, and also some fine strong-growing white oak. There is one uncommonly large oak that would square five feet.' Now, gentlemen, this was the condition of that country seventy-five years ago. Some gentlemen will say that to speak of oak squaring five feet is nonsense. I have lived in that country and know all about it. Those oaks did not stand there for ten years. They were not taken out in square timber. They were cut up into staves. They all went inside of ten years. Another point mentioned in this letter is that the custom of the country was to give one-half of the timber for sawing it.

The present average of square white pine measured off in Quebec is forty to forty-five feet, and the prices forty to forty-seven cents. I took to Quebec myself a raft that measured over 145 feet average, and they gave me only eighteen to twenty cents for it, and yet people do not think that the large timber is going rapidly. Here are the last returns for Quebec issued by Mr. Forsyth in his annual timber circular, which has been in existence for fifty years. The white pine timber, squared and waney, amounts to 2,075,000 feet, the stock to 1,300,000 feet. In 1871 the supply was 20,700,000 feet, and the stock was 15,700,000 feet. From this we find that there were ten times the supply and twelve times the stock on the market. The price was eighteen to twenty cents as compared with forty to fifty cents, the size seventy to eighty feet as compared with forty-five feet. Even with the diminished export the timber stock has fallen below that of any previous year since the trade was established. The stock would be short in spite of the increased price, and the supply may be considered as almost exhausted. People may say I am talking about timber, that there are more deals, &c., made. Do you think that the lumberman would not bring down his timber and logs which he could sell for from forty to forty-five cents instead of cutting it into boards and getting fifteen to twenty cents if the timber were there?

Mr. JOHN WALDIE.—To the question why lumbermen do not make board timber instead of cutting into boards, my reply is that the lumbermen will make double the quantity out of the trees in the market when sawn into lumber. Therefore, we think that it is a very great loss to the country to have this trade continued. I think it would be unfortunate if the quantity of board timber taken from the forest were increased. I have been lumbering for some time and not for twelve years have I taken out a board stick. I thought it was occasioning waste even to get quick money back. The reason that so much board pine was taken out in early days was to get quick money back.

If I understood Mr. Bertram right he said that fire, if it were not too heavy, did not do much harm. In Ontario the government control the fire rangers. They say: 'We will allow leaseholders to name the fire rangers and will put them on at a fixed date, and we will pay one-half and the leaseholders one-half.' The government fixes the date, and the men are sent out. It would be utterly impossible for us to reach the fire rangers after they are out in the woods if we wished to control their services. They only go to the mail once a week or once a fortnight. They are put on at such time as the government think convenient. The lumbermen are willing to respond to the efforts of the government if the government are willing to respond to the efforts of the lumbermen. The government say that if we were given control of the men we would employ them to raise potatoes, but if we give a man a house there is no reason why he should not raise a few potatoes if he wishes to do so. These men are getting one dollar to one

fifty per day. (Mr. Southworth:—Two dollars.) No, the lumberman supplies provisions equal to half a dollar, and the government pays one dollar but does not give anything. These men are out of our reach. A fire occurs and their first and only duty is to put it out. We cannot have educated knowledge from Germany at one dollar a day in the woods. All they can do is to put out the fire when it occurs.

There is one thing I would like to ask Dr. Schenck about. I was in Florida last year and some of my friends said that their territory was burnt over every year and it did not destroy the trees. Fire was a benefit to them. It would be ruin to me.

Dr. SCHENCK:—I was glad to hear from Mr. Bertram that very often fire is a tool in the lumberman's hands. It is the same in the hands of nature. If you go to the Olympic range, you will find that the trees are standing on the ashes of their fathers and grandfathers. It is the same thing that we see here in the white pine. They both require plenty of light and unless some natural event makes a good sweep of forest there is no chance for the species to propagate its kind. If we want to use fire in the forest for the purpose of making room for white pine, it may be very useful. I am making experiments at Biltmore in connection with fires and the yellow pine to find out whether it is better to burn over the old growth when wanting a second growth. I think that the outcome of the experiments will be in favour of the employment of fire. This does not interfere with the absolute necessity of guarding against fires. Suppose we have long leaf pine at Biltmore at one and a half to two and a half feet in diameter. They are about mature. The annual production is about two to three per cent. We are bound to cut, as the banks require five or six per cent. If we want to lumber conservatively we start a new crop and we can do so with the help of fire. Fire well guarded might be a silvicultural agent of the utmost usefulness.

I used to say that if I were as rich as Mr. Vanderbilt I would invest money in a long leaf pine forest. It is absolutely safe. The tree is clad in a fire-proof armor of bark, unless there are cuts for turpentine. Even the young seedlings are protected against fire. The bud is enveloped in a covering of long needles. It may lose the needles, but the bud is left intact, and it withstands the fire if it occurs year after year. The fire is not so hot as to burn the seedling entire. I have seen trees destroyed where the debris of old forests was left. There is danger also in such cases of the seedlings being destroyed. It is just like putting a cord of wood at the base of a tree so that the fire will eventually pierce through the fire proof armor of bark. Under ordinary circumstances, unless boxed for turpentine, the trees are fire-proof. If you have money to invest, go down south and invest in long leaf pine.

Mr. THOS. SOUTHWORTH.—I think our Association is especially fortunate in having Mr. Bertram and Dr. Schenck, aside from the information we have gained from them, if for no other purpose than to convince the lumbermen that scientific forestry is not inimical to the interests of their business. It is well, therefore, to have some one to tell us that the aims of the scientific forester are based on sound principles. Some three years ago I sent a circular to the lumbermen, asking if it would be possible to burn up the debris of lumbering operations in the spring. The reply was that it was impracticable on account of the expense. In the investigations of the Forestry Commission this question of getting the ground in condition to receive the seed of white pine seemed to be solved only by fire. The financial aspect is largely for the lumberman.

There is another matter I would like to speak of. Dr. Schenck has referred to the forest he controls, and the Acting President referred to the almost entire disappearance of the forests in Western Ontario. We have virgin forests not yet operated on. In addition to the two reserves previously set apart, we have set apart a tract of one and one half million acres at Lake Temagami. I would like to turn Dr. Schenck and Mr. Bertram loose there. The tract is estimated to contain three billion feet of lumber. I am sure it would be a good problem to work out its management. As an inducement I might mention that it contains two of probably the finest fishing lakes on the continent.

Mr. BERTRAM.—With reference to fire, the main object is to keep fire out of the forest. In thinking over the forest of a particular description, you will see that pine will not grow under hemlock, balsam, spruce, &c. The only way to deal with the matter is

to burn them. Another point touched upon is that in the pine forest you will see the floor covered with debris. How far is the seed able to penetrate the debris of needles and branches? This is one of the things we have to learn, and looking at the results I see in ordinary forests there seems to be no better plan than to burn the debris on the floor of the forest.

Mr. LITTLE.—This process has been used in Jersey where it is quite dry.

Hon. J. B. SNOWBALL.—Any tree that grows in the forest is useful. Any tree will make pulp. They said at one time that pine was the tree to make pulp. In France to-day they will give you as much for hemlock as for pine. Everything should be protected, and the time is not far distant when everything will be taken into account. I cannot see the spruce put in the background. I maintain that the spruce tree is far more valuable than the pine. I have both pine and spruce limits. My spruce will produce a crop every five years. If I can get one half the price for the spruce which will grow in five years, it is worth more than the pine. We can go over the land and when we go back in five years we have a good crop again.

Mr. BERTRAM.—We speak from the Ontario standpoint in regard to white pine. We have tested it and the difference in growth between it and spruce depends on the locality. In some conditions there was very little difference in growth, but where in our region we can get from fifty to sixty per cent more for pine than spruce, it is much more valuable. We get twenty-five to thirty dollars a thousand feet for pine.

THE PULP INDUSTRY IN RELATION TO OUR FORESTS.

J. C. Langelier, Superintendent of Forest Rangers, Quebec.

Within the past fifteen years the pulp industry has assumed a considerable development in Canada. It was first mentioned in the census of 1881, which gives the following figures in connection with this industry: capital invested, $92,000; wages paid, $15,720; value of products, $63,300. Ten years afterwards, the census of 1891 gave the following figures: capital invested, $2,900,907; wages paid, $292,099; value of products, $1,057,810.

The comparison of those figures shows for the ten years an increase of 305 per cent in the capital invested, of 1,758 per cent in the wages paid, of 157 per cent in the value of the products turned out.

This extraordinary progress produced a great impression on many people taking a special interest in the preservation of our forests, and some began to raise the alarm cry, proclaiming that this new industry was destined in a short time to ruin our spruce forests.

Is this alarm justified by facts? Are these fears well founded?

CONSUMPTION OF SPRUCE.

For a couple of years yet, that is, until the returns of the next census are published, the statistics of 1891 are the only ones that can give complete information respecting the consumption of spruce in the four older provinces of the Dominion, the four provinces in which, for many years to come, the pulp industry is destined to assume all the development of which it is capable.

The data given by that census are rather mixed up and confused, but by making the proper distinctions and reductions, we get at the following figures, which represent very approximatively the quantities of spruce consumed for all purposes in the four provinces:

Saw-logs	2,958,926,740 feet.
Fire wood	1,566,412,166 "
Square timber	212,582,464 "
Lath wood	111,889,150 "
Pulp wood	130,409,000 "
Railway sleepers	98,267,801 "
Shingles	67,749,166 "
Total	5,146,236,487 "

For each of the provinces respectively, the quantities are as follows:

	Ontario.	Quebec.
Saw-logs	1,049,450,350 feet.	968,133,590 feet.
Fire wood	673,049,500 "	563,398,166 "
Square timber	51,968,283 "	123,530,033 "
Lath wood	36,631,500 "	64,722,750 "
Pulp wood	57,457,000 "	65,599,500 "
Railway sleepers	59,920,768 "	20,038 333 "
Shingles	49,398,500 "	7,317,666 "
	1,977,875,901 "	1,812,740,038 "

	New Brunswick.	Nova Scotia.
Saw-logs	461,990,100 feet.	479,347,700 feet.
Fire wood	154,012,250 "	175,952,250 "
Square timber	10,604,148 "	26,480,000 "
Lath wood	5,735,900 "	4,799,000 "
Pulp wood	5,685,500 "	1,667,000 "
Railway sleepers	12,361,000 "	5,947,500 "
Shingles	.....	11,033,000 "
	650,388,898 "	705,226,450 "

What is the proportion of pulpwood?

2·53 per cent for the four provinces together, 2·90 per cent for Ontario, 3·51 per cent for Quebec, 9·03 per cent for New Brunswick, 0·23 per cent for Nova Scotia.

It must be admitted that there is nothing alarming in these figures, even for pessimists.

It may be observed, by the way, that more than 30 per cent of the pulpwood got out in 1891 was for exportation to the United States.

EXTREME LIMIT OF CONSUMPTION FOR PULP.

Let us see now whether there exists any danger for the future.

By multiplying ten times the quantity of pulpwood mentioned in the census of 1891, we get the following figures for each of the four provinces:—

	Feet.
Ontario	574,570,000
Quebec	655,995,000
New Brunswick	56,855,000
Nova Scotia	16,670,000
	1,304,090,000

Taking 600 feet, superficial or board measure, for a cord of 128 cubic feet and one and a half cords of wood to make a ton of pulp, the aggregate quantity of 1,304,090,000 feet of spruce would give enough wood to manufacture 1,448,988, or in round numbers, 1,500,000 tons of pulp. This is very nearly the total actual production of the United States, the country in all the world which manufactures the most pulp and paper. With this quantity of wood, the four older provinces could supply home consumption, ship a couple of hundred thousand tons to the American paper manufacturers, and a million tons to Great Britain, France and other European countries. It would hardly be possible, even for the most enthusiastic, to imagine a more brilliant future for this great pulp industry.

What extent of forest would have to be denuded every year to get the spruce required to make this quantity of pulp?

In the Maritime Provinces as well as in those portions of Quebec and Ontario comprised within the old limits, or to the south of the height of land, the forests can yield on an average of 5,000 feet of spruce to the acre for pulpwood, which takes in seamy and crooked trees, small top logs, even small trees, four and even three inches in diameter, growing in wet lands and swamps. Therefore, calculating on 5,000 feet of wood to the acre and multiplying by ten the quantity of pulpwood mentioned in the census of 1891, the forest area which would have to be denuded every year in each province to produce an aggregate of 1,500,000 tons of pulp, would be as follows :—

	Acres.
Ontario	114,914
Quebec	131,199
New Brunswick	11,371
Nova Scotia	3,334
	260,818

Evidently there is nothing alarming in these figures as regards the future.

EXTENT OF OUR SPRUCE FORESTS.

If, since the date of the last census, there has been cleared and put under crops 2,000,000 acres of wood lands in Ontario, 1,500,000 acres in Quebec, 250,000 acres in New Brunswick and 300,000 acres in Nova Scotia, the present area of the forest in those provinces would be about as follows :—

	Acres.
Ontario	52,818,420
Quebec	144,363,454
New Brunswick	11,224,540
Nova Scotia	10,853,544
	219,259,958

Divide this quantity by 260,818 acres, the area denuded each year, and you will come to the conclusion that it would take the pulp industry 840 years to exhaust our spruce forests, at the magnified rate of 1,500,000 tons a year. For each province separately the period of exhaustion would be as follows : For Ontario, 860 years ; for Quebec, 1,103 years ; for New Brunswick, 987 years ; for Nova Scotia, 3,255 years.

As may be seen, there is no immediate danger ; the requirements of the pulp industry, even supposing its production pushed to extremes, are not of such magnitude as to give rise to serious apprehensions with respect to the destruction of our forests.

TOTAL CONSUMPTION.

The requirements of the pulp industry represent but a very slight proportion of the needs that spruce is called upon to satisfy.

What are those other needs?

We have already seen the quantities given by the census of 1891, as used for other purposes than the manufacture of pulpwood. Let us double those quantities, and to the sum thus obtained add the quantity, multiplied ten times, of the pulpwood mentioned in the census of 1891, and you get the following results, showing the whole quantity of spruce required yearly :—

	Feet.
Ontario	4,399,417,802
Quebec	4,150,376,076
New Brunswick	1,345,261,796
Nova Scotia	1,423,788,900
	11,318,844,574

The area denuded yearly to get these quantities of wood and the number of years required to exhaust the present extent of the forests are shown in the following table:—

	Area Denuded Yearly.	Period of Exhaustion.
Ontario	879,883 acres	60 years.
Quebec	830,750 "	173 "
New Brunswick	269,052 "	41 "
Nova Scotia	284,757 "	38 "
	"	
	2,264,342	

It is a well known fact that where operations are carried on in a wise and provident manner, a spruce forest renews itself in fifteen or twenty years at most, especially when the soil is good and the climate favourable, as in New Brunswick and Nova Scotia. It is therefore reasonable to infer that even in those provinces, where the forest reserve is least extensive, the spruce forests are practically inexhaustible, inasmuch as the needs for home consumption of the lumber trade and the pulp industry are below the capacity of production and reproduction of the forests.

WHERE THE DANGER IS.

These considerations show beyond contradiction that the pulp industry does not constitute a threat or a danger in connection with the preservation of our spruce forests; on the contrary, it adds considerably to the productive capacity of those forests. The great, the real dangers, in this respect are, in the first place, fire, then the abuses committed under pretext of colonization and wastefulness in lumbering operations.

It is hardly possible, without having made a special study of the subject, to form an idea of the destruction caused by fire in our forests. Take the province of Quebec for instance. The value of the timber destroyed by fire in its forests of Lake St. John, the St. Maurice and the Ottawa, could pay the whole of the provincial debt, and still leave several millions to spend in developing its resources. In the Saguenay and Labrador districts the ravages caused by fire have been more extensive, if not more disastrous, as regards the value of timber. In one of his latest reports Mr. Low, of the Geological Survey, gives the following information about these fires:

'At least one-half of the forest area of the interior has been totally destroyed by fire within the past twenty-five years. These fires are of annual occurrence and often burn throughout the entire summer, destroying thousands of square miles of valuable timber, to the south of the central watershed (in eastern Quebec). The regions just devasted remain barren for many years, especially towards the northern limits, and the second growth of black spruce, Banksian pine, aspen and white birch is never as good or as large as the original forest. Those fires are due to various causes, but the majority of them can be traced to the Indians, who start them either through carelessness or intentionally. The Nascaupee Indians of the semi-barrens signal one another by smoke made by burning the white lichens that cover most of the ground in the interior, and these signals cause many of the fires. The southern Indians signal in a similar manner, but do not practise it to such an extent as their northern brethren, having found that they are rapidly destroying their hunting grounds. Careless camp fires in dry seasons are another common cause of these forest fires, and many of those ascribed to lightning, if closely traced, would be found to have been set by wandering Indians, who are only careful on their own hunting grounds. From what is seen on the explored routes of the southern watershed, it would appear that at least one-half of the forest has been removed by this cause.

'The greatest fire of modern times occured in 1870 or 1871, and swept the country south of the height of land, from the St. Maurice to beyond the Romaine River. The second growth is just beginning to cover up the traces of this great conflagration, which ruined the pioneers of Lake St. John, and it will be years before the country is

PULPWOOD LOGS ON THE GOULAIS RIVER, ALONG THE LINE OF THE ALGOMA CENTRAL RAILWAY.

generally again well wooded. The upper Romaine River valley has been totally burned over within the last ten years, and the margin of this great burnt area has been extended southwards during the summers of 1893 and 1894, so that now practically no green woods exist along the course of this river from the St. Lawrence to its source. The country surrounding the Hamilton River is in a similar state; except patches of original forest, along the lower part of the river valley and about Hamilton Inlet, only blackened stumps or a small second growth are seen along its course, with an occasional basis of large green wood to break the monotony. In this region great fires occur annually; that of 1893 covered hundreds of square miles of the table-land between the Hamilton and North-west rivers. Similar remarks apply to the forest of the western watershed, more than half of which has been burnt.'

VALUE OF THE FORESTS DESTROYED.

Until recent years people were under the impression that the spruce forests available for commerce did not extend below the Saguenay and that at the head of the Chamouchouan River they were bounded by the height of land or watershed between the basin of the St. Lawrence and that of Hudson's Bay. And even along that line people were convinced that at the south lay a wide belt of forest absolutely valueless as regards the production of merchantable timber. An almost equally erronous idea existed with reference to the forests of the regions lying north of the wild frontier of Ontario. In the eyes of many, this vast northern territory was nothing but an immense swamp broken by hillocks and rocky strips, covered with dwarf and stunted trees, barely suitable to be used as fire wood by the Indians.

Recent explorations, especially those made by the members of the Geological Survey, have dissipated these ideas by showing beyond a shadow of a doubt that the immense spruce forests extending eastwards to the straits of Belle Isle, northward far beyond the heights of land, westward as far as the Rocky Mountains, and far beyond the Peace River, contain merchantable timber everywhere.

In the valley of the Hamilton River, between the 53rd and 54th degrees of latitude and as far back from the sea as 250 miles, Mr. Low found white spruce trees measuring 24 and even 30 inches in diameter, three feet from the ground, and 70 feet high. He says in the report that trees of that size are not of uncommon occurrence. He also says that in some parts of the valley of the Ashuanipi River, one of the upper branches of the Hamilton, white spruce trees 30 inches in diameter and 40 feet high are pretty common, as also black spruce 24 inches in diameter. The Eaton canyon, on the Koksoak river, is about latitude 50°·30′ and longitude 68°, or more than 450 miles north of the mouth of the Manicouagan River, in the gulf of the St. Lawrence.

Mr. Low says in the report of his explorations that from that canyon descending in a northerly direction, there is a stretch of several miles on which are growing spruce trees 18 inches in diameter and 50 feet high.

All this shows that as far as the centre of the Labrador peninsula and 500 miles north of the St. Lawrence, there are spruce trees whose dimensions equal those of the largest in the finest forests of the south shore, of the St. Maurice and the Ottawa.

It is in these valuable forests of the Labrador peninsula that the Indians cause the devastation mentioned by Mr. Low. The timber thus destroyed might have yielded one million tons of pulp a year for half a century.

As to the forests in our Great North, the fires started each summer by the Indians are the sole danger to be dreaded. Protect the forest against this danger and in that corner of the province of Quebec there will be sufficient timber to make for an unlimited period enough pulp to supply the needs of the British market.

WASTE UNDER PRETEXT OF COLONIZATION.

The pillaging of the forest under the specious and alluring pretext of colonization is another danger more to be dreaded than the pulp industry.

Of late years, the value of timber has increased considerably. To take advantage of this increase a great many people—I speak more particularly of the province of

Quebec—have recourse to the colonization pretext to get at the timber. This practice is especially common in the vicinity of railroads and in places where the timber can easily be got out by water. Many interloping traders who hold no timber licenses use this pretext for securing the cut of timber which they could not otherwise obtain. In most cases they advance to the pseudo-settler the necessary money to pay for his lot, taking security that all the timber will be cut for them. Nothwithstanding all the efforts of the government to stop these fraudulent practices, they are carried on on an extensive scale, and this explains how so much land unfit for profitable farming is every year given over to colonization.

These so called settlers are a twofold source of danger to the forests. In the first place, to hide their game and give it a little colour, they feign to make clearings and for that purpose start fires which in many cases destroy considerable areas of green timber. In the second place, as their sole object is to get the wood and abandon their lots when denuded, they take only the trees that will give them the most money, wasting lots of young trees which would become valuable if allowed to grow. In the young timber thus destroyed or wasted, enough might be found to meet the requirements of the pulp industry.

Were this havoc wrought only on good lands the practice might be tolerated, because the lots abandoned by these pillagers would be taken up again by *bona fide* settlers who would make farms of them. But unfortunately the quality of the soil is not considered in the selection made by these 'winter harvesters', whose sole object is to get the timber, and as, in most instances, the fine timber grows in mountainous regions or on lands the least fitted for cultivation, it happens that most of the lots given up to colonization are not suitable for profitable farming.

Some facts concerning the district in the vicinity of Ottawa may give an idea of this kind of colonization, the object whereof is to make the settlers get their living out of the timber.

In 1891 there were in the county of Pontiac 404,795 acres of land occupied or taken from the Crown domain for colonization purposes, and of this quantity 138,548 acres, or about 31 per cent were under crop. The average yield per acre of these farms was 6·31 bushels of grain, ¼ ton of hay, 1·92 bushels of potatoes and ¼ bushel of turnips or other roots. The greater portion of the cereals consisted of oats. Estimating the cereals at 50 cents a bushel on an average, the potatoes and turnips at 25 cents and the hay at $12 a ton, the average yield of those farms was $6.70 per acre, barely enough to cover the cost of cultivating and harvesting.

The county of Ottawa had 923,614 acres of land occupied, of which 241,443 acres, or 26·14 per cent, were under crop. These yielded on an average, per acre, 6·19 bushels cereals, 0·37 ton of hay, 2·37 bushels of potatoes and 0·80 bushel of other roots, of an aggregate value of $7.79.

In the centre of Curé Labelle's famous colonization region, the townships of Wentworth, Montcalm, Howard, Clyde, Joly and Marchand, 73,258 acres were taken up for colonization, whereof 12,091, or less than 17 per cent were under crop. The product of these crops gave an average yield per acre of 4·13 bushels of cereals, 0·38 ton of hay, 2·62 bushels of potatoes, 0·54 bushel of other roots, of an aggregate value of $7.42.

Apart from this, there were 62,210 acres in pasture in Pontiac and 103,754 in Ottawa, in all 165,964 acres. Supposing the value of the products of the live stock to be equal to that of the crops, we find that the agricultural revenue of those 545,955 acres under crops and in pasture amounts to $4,036,773.

Under a well managed cutting, carried on with prudence and discernment, these lands, most of which were richly timbered, would have yielded permanently 2,500 feet per acre of merchantable timber, say a total of 1,354,887,500 feet yearly, worth $6,824,440 at the current prices of timber.

The revenue derived from the timber thus exceeds that from agriculture by $2,793,667 or over 69 per cent.

These lands are nearly all situated in the Laurentian mountains; most of them are of poor, rocky, rugged soil, on which improved implements cannot be used and are difficult and costly to cultivate, but they were covered with the finest timber. At the

present prices for spruce, sawlogs, pulpwood, pine and hardwood, the timber would bring much more than the value of the crops and would entail less labour in working.

The time has perhaps come, when we should consider whether, in the interest of the country, it would not be advisable to put a stop to this kind of colonization which does no good to *bona fide* farming, and is rapidly ruining our forests.

These facts, however, show only a portion of the loss suffered by the country by this stripping of the trees from land that is unfit for profitable farming.

The use of agricultural produce does not extend beyond its consumption inasmuch as it cannot supply any large industry. The products of the forest, on the contrary, possess an industrial value far beyond their intrinsic value.

We have seen that the 545,955 acres of land under cultivation could produce annually 1,364,887,500 feet of lumber worth, in logs or in the natural state, $6,824,440. If these logs were converted into pulp or into paper they would yield 1,091,910 tons of mechanical pulp; 272,977 tons of chemical pulp and 682,443 tons of paper, taking only one half the pulp to make paper. Calculating the cost of labour at $2.50 per ton for making one ton of mechanical pulp, at $8.00 for chemical pulp and $3.00 for paper, we find that this lumber would in its manufacture give the following in wages to workmen :—

1,091,910 tons of mechanical pulp at $2.50	$2,729,775
272,977 tons of chemical pulp at $8.00	2,183,816
682,443 tons of paper pulp at $3.00	2,047,329
	$6,960,920

At an average of $1.25 per diem, this would represent the wages of 18,560 workmen over and above those employed in cutting the logs and driving them down the rivers. These workmen and their families would constitute a population of at least 100,000 souls and with the additional population supported by these industrial centres, we should have a total of 150,000 souls.

Who will maintain that, as regards populating the country, the settlement of infertile lands can produce equal results ?

From the standpoint of national wealth, the result is still more striking.

The 545,955 acres of land on which these calculations are based, would yield farm produce to the value of $4,030,773. The yield of the forest would give industrial products worth ten times more, calculating mechanical pulp at $10 a ton at the mills, chemical pulp at $30.00 and paper at $35.00, we get the following figures :—

545,955 tons of mechanical pulp at $10.00	$ 5,459,550
136,488 tons of chemical pulp at $30.00	4,094,640
682,443 tons of paper pulp at $35.00	23,885,505
	$33,439,695

The value of the farm produce from these lands would be $7.36 per acre.

For lumbering and industrial purposes, to supply paper and pulp mills, the value of the product of these lands would be $61.25 an acre or eight times as much.

As regards increase of population it is much greater from a manufacturing than from an agricultural standpoint.

The conclusion to be drawn from all this is that the governments should give up to colonization only fertile lands, that can be easily and profitably cultivated and keep as forest reserves all that do not possess these qualities. It would be better to support at the expense of the state the unfortunately too large class of so-called settlers who take up lots merely for the purpose of cutting the timber on them and abandoning them afterwards when the forest is destroyed.

ADVANTAGES OF THE PULP INDUSTRY.

Apart from the advantages pointed out above, there are others connected with the pulp industry which deserved the consideration of all who are interested in the preser-

vation of our forests. In saw-mills nearly all the old establishments refuse to take logs under nine or ten inches diameter at the small end and the portion of the trees out of which saw-logs of that diameter cannot be made are left in the woods and lost, as are also the small trees which are cut down merely for opening roads and providing places for piling logs. Finally but little use is made of seamy or crooked trees or of those otherwise defective. Black spruce, even when of the right size for saw-logs, is nearly always left aside because it is almost impossible to saw it into deals of uniform thickness or to make merchantable lumber of it.

The pulp industry makes use of all this wood rejected as saw-logs and thereby increases by at least 20 per cent the productive value of our pulp forests. In the province of Quebec several manufacturers doing business on a large scale are beginning to understand the advantages offered by the pulp industry in this respect and are erecting pulp mills in connection with their saw-mills for the purpose of using up the refuse stuff which has hitherto been lost.

In some saw-mills on the St. Maurice a system has been adopted which also possesses great advantages. Even in the best saw-logs only two or three choice deals are taken without making board to square the logs. The thick slabs are squared and converted into pulpwood which is worth more than the inferior quality boards that were formerly made in preparing the logs for sawing into deals. By this means they get only first quality deals, and avoid the accumulation of boards of inferior quality, which would glut the market and affect the price of good lumber. Finally all the seamy and broken logs are turned into pulpwood as they come from the boom instead of allowing them to be wasted as was formerly done.

If this system were adopted everywhere, the pulp industry would be supplied with raw material in a great measure from the refuse of the saw-mills, and 20 per cent would be added to the productive value of our forests without in any way hastening their exhaustion.

It is therefore reasonable to say that the pulp industry does not constitute a danger for our forests and that, on the contrary, it is calculated to add greatly to their value.

WHEREIN THE DANGER LIES.

The apprehensions that have arisen in connection with this industry are due to the confusing of the cutting of timber for our own mills with the cutting of pulpwood for exportation to the United States.

The owners of Canadian mills get nearly all their timber from limits belonging to them. They are interested in preserving their forests to keep up the value of the capital invested in their mills. Take for instance those of the Laurentide Pulp Company which cost from $1,500,000 to $2,000,000 and require yearly a supply of some twenty million feet of lumber. What would the two million dollars represented by its mills, machinery and plant be worth if its lumber were to fail? The management of this company are so alive to the danger, that they have adopted a complete system with regard to cutting timber which assures its supply *ad infinitum*. They carefully watch over the protection of their forest and their only fear is that under pretext of colonization their domain may be so encroached upon as to render it unable to supply all the lumber needed for its mills.

The same applies to all the large companies having mills in this country. But it is otherwise in the case of pulpwood cut for exportation to the United States.

The raising of the duty on pulpwood cut for exportation on Crown lands has brought in a host of merchants who buy timber cut on patented lands or lots belonging to individuals which are not subject to the regulations of the provincial government respecting the cutting of timber. As prices are comparatively high and purchasers take timber as small as three inches diameter, the forests are razed and not even the young trees are left for producing seed and the reproduction of the forest. This is really a devastation worse than the ravages of fire.

The danger lies in this and it is all the greater that the quantity of pulpwood cut for export is much greater than that cut for the Canadian mills.

Unfortunately the provincial governments have no way of controlling this cause of the ruin of our spruce forests. The only remedy would be to have an export duty imposed by the federal authorities. The wise measures taken by the provincial government will have but slight results until completed by the imposition of an export duty which would also affect the timber cut on lots under patent. The present state of affairs is conducive to fraud and is a source of trouble for the provincial governments. To evade the stumpage duty lots are taken under the pretext of colonization and all means are resorted to in order to get the patents for them so as to free the timber from the duties imposed by the provincial authorities.

Therein lies the great danger as regards the pulp industry.

FOREST BOTANY IN SCHOOLS.

W. H. Muldrew, B.A., D. Paed., Gravenhurst, Ont.

A few months ago I became acquainted, in a rather roundabout way, with the Canadian Forestry Association and very soon found myself an interested member. I read carefully your constitution and noted especially your appreciation of the necessity for creating in the minds of the rising generation an interest in the problems of practical forestry. But just here, where you seemed to approach a phase of the question that might particularly appeal to me, you stopped short.

Usually, nowadays, when an organization feels the need of cultivating an interest, or a bias, or, possibly, even a prejudice in the mind of youth, one of its first steps is to call loudly upon the schools to take up the matter. Thus we have been assured of late that the future safety of our country depends upon the diligent teaching of musketry, along with the three R's. to our tender babes at school; while at least one enthusiastic reformer favours a sort of out-door Sunday-school with a similar object. We are told that the rural population will no longer flock to the cities when thoroughly grounded in scientific agriculture and that the 'servant girl problem' can be readily solved by the judicious teaching of 'Domestic Science' in our public schools.

This being the case those who have at heart the interests of our schools have learned to look with some suspicion on such proposals and they have formed the habit of estimating carefully the educational values offered before adding to the burdens already borne by teachers and pupils.

The Canadian Forestry Association, however, in its modesty has made no such suggestion and for this reason it may be the more appropriate that the subject should be approached by one who must be an educator first and a forester afterwards.

It is pretty generally admitted nowadays that some acquaintance with Natural Science is a very desirable part of an education and this fact has been widely recognized by the admission of Botany to our schools. Laying aside the extravagant expectations of certain advocates of nature studies it may still be doubted whether the results are satisfactory. The net profits of a year's course in Botany for the average student are limited. Briefly stated the results which might be expected from an elementary course in natural science would be somewhat as follows: (1.) A very marked strengthening of the faculty for rational observation and comparison, with a corresponding gain in the ability to draw logical conclusions; (2.) an organized body of knowledge concerning some department of nature and (3) an interest in nature based on such knowledge and impelling to continued observation and study.

There was a time when Botany could be taught without attaining even one of these results; but with practical lessons such as are now the rule the first mentioned must always be associated. There is more doubt as to the second and third headings and it can scarcely be questioned that a large proportion of students are graduated from our classes with a knowledge of and interest in the plant world that will not withstand for many weeks the ravages of time.

I believe that the reasons for this lie largely in our methods of approaching the subject. Because children are attracted by the beauty of a violet or a lily we con

clude that they must be equally interested in the intellectual aspects of the same and we proceed to instruct them in the characteristics of the floral organs in the various groups until they may well be excused for affirming that Botany is the 'Study of Flowers.' When this process has gone far enough to enable learners to identify species by means of a key a very important point has been gained, but even then there is great danger lest these attainments themselves should wither and perish for want of some substantial basis of interest.

Knowledge and interest are curiously interwoven in our minds so that neither is possible without the other. We take no interest in things wholly strange to us and we learn only those things that interest us sufficiently to arouse our attention. Some years ago, following out this principle, I came to the conclusion that the part of elementary Botany that was most eminently suitable as an introduction to the subject was to be found in the study of our native trees. These are in some measure known to every school boy; their size and permanence give them an individuality not attributed to the herbs of a day; and their numerous points of contact with the life of the people remove them from that foreign world in which the typical botanist is supposed to exist. But, unfortunately for their claims, the floral organs of the trees are often their least conspicuous and most difficult feature and hence it frequently happens that an elementary course in Botany is completed with scarcely a reference to their existence.

If any one doubts this statement let him ask the members of an average botanical class of a year's standing to identify a half dozen of our common trees—to distinguish varieties of the maple, or to make a list of cone-bearing evergreens. Those who have had the good fortune to be bred on a Canadian farm will stand the test fairly well; the others will probably experience much the same state of mind as if asked corresponding questions about the Silurian fossils. Not very long ago a flowering twig of white pine was labelled Equisetum (i. e. Horsetail) by a candidate at the senior leaving or honour matriculation examinations. Yet he was not found deficient in botany and made good marks on his paper.

Now, is it a fact, settled beyond dispute, that elementary botany must consist mainly or altogether in the study of flowers? If so, this association need take no further interest in the matter. A knowledge of trees made up of facts about petals and stamens and catkins will not go far towards solving the problems of forestry. But, to return to the teacher's standpoint, what value can the subject retain after the floral organs have ceased to be the centre of attention? In other words, is there a common ground where botany and forestry can meet with mutual advantage?

We can scarcely overestimate the value of identification and naming in the earlier stages of natural science studies, especially when these are made possible by the unaided efforts of the learner, and it is probable that this is the most valuable discipline ordinarily afforded by botany in our schools. It has been already pointed out that the trees are practically excluded from such treatment by our usual methods and we must seek some other basis if they are to receive anything like the attention that is due to them.

Readers of the official organ of the Canadian Forestry Association have already been acquainted with my theories or hobbies in this connection through an editorial in the January number. Without needless repetition I would merely say here that I have found it possible by basing our observations mainly upon the foliage to enable a beginner to identify and name our common trees and shrubs in a surprisingly short time. By this means our autumn term in what I have termed forest botany has been made a most interesting and valuable part of a first year in science. The infinite variety shown by the leaves in arrangement, form, margin and their many other features offers abundant material for observation, comparison and drawing. The life of the forest with all its 'mystery and magic' appeals to the mind of youth, and its obvious relations to every day activities and to literature combine to sustain the essential element of interest. The resemblances and differences giving rise to specific and generic characters are here plainly suggested and the general principles of classification can be early introduced. The relation of forests to rainfall, the flow of rivers, etc., forms a very interesting chapter in physical geography that need not be dwelt upon here.

Further consideration of the educational values of such a study will scarcely appeal to my hearers, but I must touch upon some of its relations with forestry and other activities. It is vain to attempt to interest people in matters of which they are ignorant. A little superficial enthusiasm may be aroused, but it will subside faster than it grew. If the rising generation is to be trained to *think* intelligently about our forests it must first be trained to *know* them.

To this end I offer two suggestions. The first of these is that a practical knowledge of our native trees should be required of our teachers and that forest botany should be taught informally in our public schools and formally, as a part of the science course, in our high schools. We have now an annual Arbor Day for planting trees; why not devote a few minutes occasionally to the names and uses and literature of our maples and pines and elms? Are there any characters in our history who have done us more good and less evil, to whom we owe more in our development as a nation? What poet has an influence comparable with that of our autumn woods? Even on the high ground of patriotism is it not evident that some of the strongest ties binding us to our native soil are the features of the face of nature which remain constant wherever we may wander. What would Highland Scotland be without its heather or Canada without its maples? The south-western peninsula of Ontario contains very many trees and herbs that obviously belong to the region south of the great lakes, and that part of the province always has for me a pseudo-American aspect. (It seems not so exclusively Canadian, don't you know.) Let us learn to love our land by learning to know at least the distinctive features in its landscapes.

My second suggestion refers more particularly to our Ontario high schools, where I have reason to believe that a change in the present science course is now under consideration. The tendency of this change will, no doubt, be towards the recognition of those topics which bear on the industrial life of the people, with an elementary course to embrace the fundamental principles of the various sciences. In such an arrangement forest botany would be surely worthy of an honoured place in respect to its relations to the pure sciences on the one hand and to economic problems on the other. Our secondary schools have long been encouraged in the equipment of their laboratories by a liberal annual grant based upon the value of their scientific apparatus. Would it not be a wise measure to extend or modify this system so as to include living collections of the trees of the various neighbourhoods? We have now growing in our grounds here upwards of one hundred species of trees and shrubs native to this part of the province which have been planted for the most part by teachers and students. Can not such an arboretum, growing every year more useful, be fairly compared in educational value with a collection of physical and chemical appliances that must of necessity deteriorate or become obsolete? Yet the arboretum can be established at a fraction of the cost and, with a little care, will prove an increasing asset for an infinite period. I need not enlarge on the advantages of such a centre of interest for local students of forestry.

Is it worth while to ask our educational authorities to consider these matters? In a country where people are afflicted with such a mania for the destruction of trees, would it not be wise to inoculate the youth with a few ideas adapted to mitigate a disease which already has done so much harm? When statecraft and science have agreed upon the terms no doubt their patient sister, Cinderella of the schools, will do her duty with her usual conscientiousness. Meanwhile she can only wait further instructions from her superior sisters while busied with the duties that lie nearest to her hand.

I do not wish further to occupy your valuable time. Permit me to say in extenuation of the fragmentary notes that they have been jotted down in the brief intervals allowed by other duties and have been put together under the stimulating influence of la grippe. I should have been very glad if circumstances had permitted me to be present and to discuss with more detail the matters here suggested, but in acceding to the request of your secretary, as far as I could, I hope I have brought to your attention one phase of the problems that you seek to solve. I wish you all success in your unselfish devotion to so worthy a cause.

Dr. James Fletcher, Dominion Entomologist, followed with an interresting paper on 'Forest Insects.' At the outset, Dr. Fletcher also spoke of the terrible destruction wrought by forest fires, for, besides the wood thus destroyed, the trees that are left standing, which have been more or less injured by the heat, soon become attacked by wood-boring beetles. While there are a great number of injurious forest insects, yet, at the same time there are many beneficial ones. Many of these latter act as scavengers removing decaying vegetable and animal matter. It is, therefore, of importance that a knowledge of insects, both injurious and beneficial, should be in the possession of those who make a practical study of forestry, so that they may be in the position to make the most of their operations. Dr. Fletcher exhibited a case of the insects most injurious to forest trees. Among those shown were such well known pests as maple borers, pine borers, tent caterpillars, spruce saw-fly, pine saw-fly, tamarack saw-fly, willow saw-fly, spruce gall-louse, hickory tussock moth, walnut case bearer, canker worms, web-worms, basswood looper, etc., etc. Mention was made at some length of the most important of these pests. As to the numbers of insects which may attack one tree, he mentioned that there were over five hundred species which attacked the oak. The only way to fight these insects is to find out their nature. The conditions must be made as unfavourable for them as possible. One method which has been adopted for preventing injury by insects after logs have been felled, is that known by the name of 'rossing.' This is simply cutting a strip of bark from the top of the log, so that the air and moisture may separate the bark from the log, for the insects must have for their first food the decaying matter between the bark and the wood of a dead tree. If by opening up the bark conditions are produced which are unfavourable to the growth of these insects, these logs are saved. When the logs are left in the woods over until the next winter, another plan is sometimes adopted, viz.: that of covering the logs with branches of evergreens. The beetles are sun loving creatures and it is probable that they do not resort to timber thus protected to lay their eggs. If the logs can be got into water they may be saved, but even then the eggs may be laid on the upper surfaces. Dr. Fletcher exhibited a hickory axe-handle which had been destroyed by the powder post insect. The handle was badly attacked by this pest, and when touched much of the flour-like powder would fall. Before concluding, the speaker referred to certain remedies which had been found successful in combating injurious insects. He explained that insects were economically divided into two classes, composed of those which bite their food when eating, and the other of those which insert their beak into the tissues of the plant, shrub or tree, and suck out the sap. Against insects of the first class, Paris green and other arsenical insecticides are widely used. For sucking insects the infested shrubs and trees may be sprayed with kerosene emulsion, whale oil soap, or tobacco and soap wash. There are also other insecticides which are used for special insect pests, of both these classes.

Mr. HIRAM ROBINSON:—I think that the papers we have had to-day have been admirable. I wish to thank Dr. Fletcher for his lecture and also to emphasize what he said in regard to Mr. Langelier's excellent paper. I listened with great pleasure to the reading of that paper, and I think he struck the key-note in regard to the protection of the forests when he spoke of setting apart the lands unfit for cultivation, and also in regard to the cutting of undersized trees. If these two points are carried out, we might recut a forest of pine in twenty years, provided the trees were properly selected in cutting. We have not the means to reforest to any large extent at present, but I think we are on the right road to do this. To protect what we have is the great point we should aim for. We have great possibilities, and if we can only protect what we have and go on and reforest where we have at present no forest at all, the problem will be gradually solved.

Mr. W. C. EDWARDS:—I have not had the pleasure of attending many of the meetings of the Association. This matter of forestry is one in which I, with all lumbermen, am very much interested. I was one of the prime movers in establishing the system which now exists for the prevention of fire in the province of Quebec. Fire as a consequence of illicit settlement has been the greatest possible enemy to the lumber interests of Canada. I think there has been twenty or thirty times the quantity of for

est ruined by fires than has been cut by lumbermen. I think I am within the limits in saying that in the province of Quebec they would be two hundred to three hundred million dollars richer if the forests had been preserved from fire. It is true that tremendous destruction has taken place, but it is not yet too late to save what will be, at least to the province of Quebec, a large income for all time. The statement about cutting carefully is one of very great importance.

There is another point, and it is one upon which I differ from almost every one. There is a great desire on the part of the people of the province of Quebec and on the part of Ontario to stimulate to the greatest possible degree the production of pulp. Pulp industries are going to be built too rapidly in Canada. In the pulp industry the tendency is to cut too small. For the safety of Canada we should not ask outsiders to come in and push these interests. They will be started with Canadian capital and by Canadians as fast as it is good for them to be established.

With regard to the forests, I am going to make a bold statement. I believe that the province of Quebec is the most valuable of the provinces. It is more valuable than any other province or state on the North American continent. I think that there are three reasons why this heritage should be preserved: First, because the country covered by forests is almost useless for agricultural purposes; second, the province of Quebec has more valuable water powers than any other state on the North American continent, and if the water powers are to be maintained the forests must be preserved; third, because through the advance in chemistry and the advances that are being made generally, every portion, every twig, that grows will become valuable for manufacturing purposes, and you will want the product of the forests to supply the work for these water powers to do.

The forests have had the enemy of illicit settlement. The lumbermen of the Ottawa Valley will never have any quarrel with legitimate settlement. I am not in favour of the schemes for building railways to James Bay. The building of these railways will encourage settlement on lands which are only fit for timber production and will very much increase the danger of fire. The result will be to make Quebec an absolutely bankrupt province. I have no selfish interest in this, because they will not build the railways soon enough to hurt me. If this country becomes denuded of forests we will not have the same rainfall. In this Ottawa Valley we have, I believe, a greater average rainfall than in any other part of the country. I believe this is largely on account of the forests that exist here. I hope that your efforts in this direction will not end in having meetings and passing resolutions, and that you will do most effective work for the preservation of the forests of Canada.

Mr. George Johnson submitted the report of the Resolution Committee, and the following resolutions suggested by them were adopted:—

RESOLVED that the Canadian Forestry Association in annual session desires to offer to Your Majesty their condolences on the occasion of the demise of our Queen. For sixty-three years your august Mother has been closely connected with all the public events of Canada. She has been the centre of our thoughts as Queen and Woman for all these years. To lose our Queen was to lose one who had entwined herself with our homes, courts, and literatures, till she became an intimate part of our public and private life. In our sorrow we can sympathize with Your Majesty in the loss we have all sustained by the removal of our Queen, Your Majesty's Mother.

We realize from the words and acts of Your Majesty that in the midst of our sorrow we have the comforting assurance that the policy of the Empire will be a true and generous development of those principles which were the central ideas of your Mother's life as Queen of Great and Greater Britain.

RESOLVED that, while regretting the unavoidable absence of our honoured President, this Association desires to congratulate him on his elevation to the high position he now occupies and to thank him for the continued interest he manifests in the aims and objects of this Association.

RESOLVED that the thanks of the Association are due and hereby given to the Railway Companies which have so generously granted reduced rates to members attending the Annual Meeting.

RESOLVED that the thanks of the Association are due to the Press for their attendance on this occasion. The Association desires that the general public take an intelligent interest in the great subject of forestry, and as the Press is the medium by which the public can best obtain knowledge of the purposes of the Association, the attendance of the representatives of the Press ensures the growth of a sentiment that will support the Association.

The election of officers was then proceeded with, which resulted as follows:— Honorary President, His Excellency the Earl of Minto, Governor General; President, His Honour Sir Henri Joly de Lotbinière; Vice-President, Mr. William Little; Secretary, Mr. E. Stewart; Assistant Secretary and Treasurer, Mr. R. H. Campbell; Directors, Mr. Hiram Robinson, Dr. Wm. Saunders, Professor John Macoun, Mr. Thomas Southworth, Mr. W. C. Edwards, M.P., Mr. C. Jackson Booth, Hon. G. W. Allan.

The meeting then adjourned.

At the conclusion of the annual meeting a meeting of the Executive Committee was held, at which the following were appointed Vice-Presidents for Provinces and Districts:—

Ontario, Mr. J. B. McWilliams; Quebec, Hon. S. N. Parent; New Brunswick, Hon. J. B. Snowball; Nova Scotia, Dr. A. H. McKay; Prince Edward Island, Sir Louis Davies; Manitoba, Mr. Stewart Mulvey; Assiniboia, Mr. J. S. Dennis; Saskatchewan, Mr. J. G. Laurie; Alberta, Mr. William Pearce; Athabasca, Mr. F. D. Wilson; British Columbia, Mr. H. Bostock; Yukon, The Commissioner; Keewatin, the Lieutenant Governor of Manitoba.

THE COMMERCIAL SIDE OF GOVERNMENTAL AND PRIVATE FORESTRY.

BY C. A. SCHENCK, PH. D.

(*Lecture delivered at the Evening Session held in the Assembly Hall of the Normal School.*)

FACTORS UNDERLYING CONSERVATIVE UTILIZATION.

The lovers of the American forest have been labouring over the forestry problem for a number of years. In the mean time the owners of woodland have continued to solve the problem in their own way by converting trees into ready money. Only a few cases are on record in which private individuals have practised conservative forestry,—evidently without knowing what they were doing. If we investigate into the state of affairs driving those individuals towards a conservative use of their forest-holdings, we find a constellation of circumstances, under which conservative use of the forest yields larger returns than forest destruction.

Woods at Biltmore.—Rankin's Range, after a nearly clear cutting to remove objectionable growth.—Wood piled along secondary wood road.

The most striking examples of such 'unconscious' forestry are reported from the Longleaf Pine Belt in the Southern United States, a section where logging is practicable all the year round, where taxes on forest-holdings used to be low, and where the pine trees, clad in a fire-proof armour of bark, are well protected against destructive conflagrations.

Obviously as long as the gigantic trees of the primeval forests cannot be approached, as long as the expense of transporting the timber to the market surmounts the price obtainable for it, the owner of the forests cannot actually practise forestry. Later on, when the country has been opened up by railroads and navigation, the cost of marketing the trees is reduced and stumpage begins to command a price. From that moment on, it will pay to use the forest.—It will even pay to use it conservatively, provided that the facilities for logging are good; that the 'second growth' is safe from fire; and that the accumulating taxes payable whilst the 'second growth' is coming up, do not devour a large percentage of the gross returns obtainable from a 'second growth.'

INDUCEMENTS AT THE EXPENSE OF THE PEOPLE.

If the government wants to encourage the movement towards conservative forestry on private holdings, it must see to it that these conditions are provided for at governmental expense. Then only forest-preservation is a safe and remunerative business.

When the government wants to have the system of railroads enlarged, it gives inducements to prospective railroad companies making railroad investments safe and remunerative. Why should government hesitate to follow a similar course when the development and the maintenance of our forest resources are at stake?

Obviously, the virgin-forest should not be preserved; the virgin-forest is unproductive; the annual production of woody tissues is exactly offset by the annual death and decay of timber. If such were not the case, our virgin woods would get so dense in the course of the years that neither deer nor man could penetrate them.

In the well-managed forest the mature trees are removed, and just that much timber is left on every acre as suffices to fully digest sunshine, rain and air,—the food of the forest.

Broadly speaking, the stumpage is cut back to that figure at which the ratio between the annual accretion of woody tissue on the one hand and stumpage remaining on the other hand is a maximum. Where this maximal ratio prevails, the highest possible interest on the investment is derived.

REGULATION OF WATERS.

Objecting to the proposition of skimming the forest by cutting its best trees, you will ask: 'Does not such business-forestry interfere with the role of the forest as a regulator of drainage and navigation? Does it not cause the huge water reservoir to leak, which the forest is said to form?'

The propriety of the question cannot be doubted. We should not forget, however, that any use of any natural resource is bound to leave it in a deteriorated condition. Besides, the vegetable litter and the lumberman's debris decaying on the ground—to a much higher degree than the trees—act as a hygroscopic sponge soaking up the falling precipitations and causing them to gradually percolate into the lower strata of mineral soil.

Remove the deep mould covering the foot of the trees—for instance by fire—and rapid surface-drainage will take the place of a slow underground-drainage. In road-building and road-maintaining, striking proof may be gathered of the interdependence between run-off and soil-cover. All other conditions being equal the road requires constant repairs, where it leads through abandoned clearings or through heavily burned timber tracts. True, the trees themselves contain a large amount of moisture. On an average, 45 per cent of their weight is formed by water, and when burning a cord of green wood, you evaporate over 250 gallons of water.

Still, the amount of water contained in the trees fluctuates within narrow limits. In a period of drought it may drop down to 40 per cent, and after continued rains it may rise to 50 per cent. What is that hygroscopity of the trees compared to the soaking power of the vegetable carpet on the ground? Experiments have shown that the weight of the soil-cover after heavy rains is increased ten-fold.

PLACE OF FORESTRY.

Enthusiastic advocates of forestry have often deplored the disappearance of the forests from the very land where they used to grow most luxuriously. I refer to the rich land along the river bottoms. To the cause of forestry this enthusiasm has done more harm than good. Mere common sense prescribes the rule that every acre of ground shall be devoted to that production under which it pays best. The most fertile land is justly claimed by agriculture and pasture; forestry must be properly relegated to land unfit for field crops or to a rough climate, where wheat and corn are apt to fail.

In Germany where forestry is certainly at home, agriculture and forestry are invariably interwoven, being considered 'sister and brother.' The famous Black-Forest is far from being an unbroken wilderness. It is dotted with villages occupying the most fertile spots. During summer, the population works on the grass lands and in the fields; in winter, the forest claims all available labour.

In the Black-Forest, the supplies for the logging camps are largely raised on the 'forest farm,' and, obviously, the 'forest-farm' finds a ready market for its bulky produce in the logging camp.

In the Black-Forest, a paternal government prevents irresponsible farmers from devoting absolute forest-soil to farming,—farming, of course, at a loss to the owner, and soon at a loss to the people, when the farm is found to be unproductive and is abandoned by its owner.

In this country the immigrant cannot possibly foretell what forest land, being of a truly agricultural character, should be cleared and used for farming, and what wooded tracts, under the prevailing conditions of soil, climate and means of communication, should be left to the production of timber. Some paternal supervision, some amicable foresight must be exercised by the government, and only such land—on the other hand all such land—must be delivered to the plough, on which farming pays better than a second growth of trees.

FOREST REVENUE.

The question will be asked: 'Does forestry pay at all? Pointing to European or to Indian experience, the forestry scholars used to prophesy that large and rising returns can be safely expected from forestry. To the unprejudiced observer it seems strange that the American wood owner, the lumberman, is far from sharing the scholars' opinion. The American lumberman, standing in the foremost rank of successful business men, proves by the very success of his business, that in this country—aside from exceptional conditions already cited—forest destruction pays better than forest preservation.

Obviously, the people as a whole, being interested in forest preservation, cannot attempt to restrict individual rights, without compensation, for the benefit of the commonwealth.

On the threshold of the 20th Century, it would not do to simply forbid the devastation of forests owned by private individuals in the face of the fact that forest destruction is, from the merely commercial standpoint, superior to forest preservation.

If the people realize that the maintenance of the forests is a necessity for their welfare, they must be willing to spread over the entire country those—now exceptional—conditions under which conservative management of private woodlands is a safe and remunerative business.

Forestry as an investment is unsafe as long as fires cannot be prevented from destroying the forest. True, the primeval forest is fairly fire-proof. As soon, however, as the removal of the mature timber allows the sun to roast the vegetable litter on the ground whilst at the same time inflammable debris is increased, the seedlings, saplings, poles and immature trees left intact by conservative utilization of the forest are badly exposed to destruction by fire.

The virgin forest in America and the well-managed, long-established forest which you find in Germany and France, are fairly fire-proof. The 'transition-forest,' however, which necessarily leads from primeval conditions to those of regulated production, is

very badly endangered by fires. Now, during the transition stage, is the time for action. Sixty years hence the virgin forest will be replaced by a forest allowing of regular management, if protection is carried through, or else will be replaced by barrens, if protection is denied.

For the average owner of woodlands, protection from fire during the transition stage, at his own expense, is practically impossible, the annual outlay being larger than the annual yield of the forest.

Only on very large, compact holdings—say tracts of over 100,000 acres—protection from fire can be effected at a reasonable expense. Still this expense, added to the taxes due annually, gradually grows up to a sum almost covering the gross receipts obtainable from a second growth in the forest.

Let us suppose, in order to clear the situation a little better, that a lumberman working conservatively has left in his forest, per acre, a young and immature growing stock of spruce scaling 1,000 ft. b. m. per acre. After protecting his forest for 20 years, he will be able to cut (compare Pinchot, 'The Adirondack Spruce,' page 79 ff) 2,000 feet b. m. of mature timber, worth, say $3 per acre. The yearly expense of protection from fire was five cents, the yearly taxes were two cents per acre during that period of waiting. Both outlays taken together have accrued, figuring at 6 per cent interest, to $2.57 in the course of 20 years. Thus a net yield of only ($3—$2.57) or 43 cents per acre is left to reward the venture.

The owner cutting slightly and working conservatively takes great risks, because he leaves a large capital exposed to destruction by fire.

The owner cutting heavily and leaving almost no seedlings, saplings and poles on the land, takes small risk. Still, in his case the period of waiting for a second cut is so long, that prospective taxes and prospective expenses consume all hope of a remunerative outcome of the venture.

Where protection from fire is absolutely assured, a second growth of trees, in my opinion, cannot be prevented from developing. Even against the wish of the owner the trees will encroach upon the cut-over land. For thousands of years, before the advent of fires, one generation of trees, in the natural course of events, has replaced the other.

Thus, if the people of this country care to engage in a far-sighted policy, if the providential functions of government relative to forestry are understood, let them furnish laws and a salaried staff to enforce these laws by which forest fires are prohibited. Then only we can expect private forestry to be practised, because then only private forestry is a safe and remunerative investment.

For the Dominion and the provinces, in their capacity as forest-owners, similar considerations hold good. Both are in the lucky position of owning large and compact tracts, so that the expense of protection, per acre of land, is greatly reduced. Both have the power to enact laws suiting the task, with a view of perpetuating the forest whilst using it. At the same time the interest of the commonwealth demands that no acre of virgin forest shall be touched, unless the land is fit for farming or unless the forest, during and after lumbering, is fully protected from fire.

Does forestry mean 'economic stagnation?'

It certainly does not.

FORESTAL INVESTMENTS.

Forestry means 'the proper handling of forest investments.' Forestry intends to transform unproductive woodland into a capital yielding large revenue. The forestry investments are cut down, on the one hand, by the removal of mature timber, and are increased, on the other hand, by creating a system of floatable streams, of forest railroads and wagon roads. By these means the farms and pasture grounds—possibly the mines as well—scattered throughout the forest are made simultaneously accessible and more valuable. The investments are further increased by the expense of land surveys and stumpage surveys. Only on the basis of such surveys can a plan for further business operations—notably for railroad building—be properly draughted. In addition,

fire lanes connecting the water-courses (thus joining the natural fire-breaks by artificial ones) might be made, and a system of patrol-trails might be created and hereafter maintained, invaluable in case of fires, helpful in logging operations and welcome to hunter, fisherman and health-seeker.

It should be continuously borne in mind that the revenue which forestry means to draw from forestal capitals is not necessarily made up by returns exclusively obtained through sale of timber. If it is financially advisable, with due regard to the prospect of the future, to use forest ground for forest pasture, or for farms or for the production of tan-bark, or for whatever production (rosin, pulp, cork, rubber, fruits, game, minerals) you can imagine, then true forestry means to engage in that most promising industry, or, possibly, in a combination of several of them.

Natural regeneration of Scotch Pine.—Prince of Penbourg's Forest, near Acomstadt, Germany.

For the commonwealth as a forest-owner, a considerable share of forestal revenue frequently consists of 'pennies saved,' which, if the old proverb is not mistaken, are in no way the inferiors of 'pennies earned.'

If by regulating, by handling the forestal investments properly, the manifold losses can be reduced, which threaten navigation, water supply, irrigation, agriculture, public health, property destructible by floods, then every penny saved by such handling and regulating is a penny legitimately earned by forestry. In other words: the gross

returns from forestry practised by the commonwealth are not tangible goods only; the yield of the forest consists, to a large extent, of safety, of assistance, of insurance furnished to the people and to their industrial vocations.

Within the forest itself, these 'indirect' blessings are scarcely ever felt. Hence the private individual owning forests does not care to produce them: the pennies saved are not saved for him.

In addition, 'indirect' revenue cannot be derived from the forest in many a case without curtailing the 'direct' monetary revenue. Private forestry, left to itself, cannot be expected to meet the combined tasks.

Where the private forests form a small percentage only of the total forest-area of a country, no harm is done by disregarding them.

In the opposite case, the liberties of the private owner must be restricted with reference to the free disposition over woodlands (as was done in Europe since centuries), or else the owner must be continually driven, at the expense of the people by financial inducements, towards that forestal practice, which makes the forest a source of direct and indirect revenue.

Whether it is not preferable for the government to practice forestry on its own account, rather than to enter the slippery road of inducements and bounties, is a question open since Adam Smith's time. Only thorough appreciation of the economic and politic sphere of a country allows of solving the problem in a given case.

THE FUTURE.

The development of Canada's gigantic forest reserve must be necessarily slow. When it is accomplished, after the lapse of another century, Canada may supply the entire world with timber. If in the year 1750 a prophet had dared to foretell the actual happenings in German forestry, he would have been laughed at by all intelligent people. At that time square miles of forest could be bought at the price now fetched from the sale of a single oak tree standing in it.

For more remote districts, it can be historically proven, that the spread of forestry abroad was closely connected with the expansion of roads and railroads. A tree (–just think of the enormous Mahogany trees in middle America!–) has no value, unless it is within reach of transportation. If a tree has little value, the seedling promising to develop into a tree after a hundred years only, has practically none, and, consequently, it does not pay to put any stress on its propagation and protection.

Forestry investments, like those of railroads and insurance companies, are as a rule long-time investments. The forester is compelled to look far ahead into the future. In many a case the teachings of history throw light into the darkness of coming events.

In Canada, if the population continues to increase, if the facilities of transportation continue to be developed, the price of pine stumpage, 80 years hence, might be $20 per 1,000 feet b. m.—, the price now prevailing in Germany and France. If such are the prospects, Canada will be the richest country on earth before the dawn of the next century, provided that she continues to conservatively manage her forest resources; again, if such are the possibilities, we should at once proceed to reforest every acre of ground unfit for the plough but fit for timber production.

If such are the chances, every sapling in the forest should be as carefully protected from fire as if it were a paper dollar-bill.

Away with shoreless dreams! Let us return to reality. I have no time to dilate on the indirect utility of the forest, of the forest as a healer, of the forest as the regulator of water and navigation, of the forest as an employer to the wage-earner. The indirect utility of the forest is apparently most highly appreciated where no forest exists. In the United States millions of dollars are spent for raising forests in the treeless regions, and scarcely a cent for preventing forests from losing ground on soil fit for timber production only.

No stronger argument can be proffered for governmental forestry than the present condition of the forests east of the Mississippi left helplessly in the hands of private owners. Adam Smith (who condemned state forestry 100 years ago) would quickly

change his opinion, if he could see conditions now prevailing in private forests, even in Germany. Conservative use, far-sighted forest policy cannot be expected from short-lived men. The commonwealth, an association of families formed for purposes not limited by time, is the proper owner, the most successful manager of forests.

Main Road through Forest at Viernheim, Germany, one side underplanted with Beech, the other not.

In addition, great freedom may be given to the acts of private owners, if the far larger percentage of the forests is controlled by the people or—which seems the same—by the Crown.

R. H. CAMPBELL, Treasurer.

In account with The Canadian Forestry Association.

DR. CR.

Date.		$ cts.	Date.		$ cts.
1900			1900		
March 8 to Dec. 31	To Membership Fees.	192 00	April 20	By Expenditure for Books for Secretary..... ...	7 80
Nov. 30	" Interest.....	45	June 1	" Expenditure for Annual Report.....	75
			" 1	" Expenses of Asst. Secy. at Montreal.....	3 00
			July 25	" Mailing Annual Report	3 50
			Dec. 3	" Expenses of Asst. Secy. at Montreal.....	2 25
			" 31	" Balance.....	175 15
		192 45			192 45

Examined and found correct.

GEORGE JOHNSON,
JAS. M. MACOUN, } Auditors.

MEMBERS OF THE CANADIAN FORESTRY ASSOCIATION.

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Ami, H. M., M.A., D. Sc., F.G.S., F.G.S.A.	Ottawa, Ont.
Anderson, J. R	Victoria, B.C.
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Butler, M. J.	Deseronto, Ont.
Bell, Robert, B.A.Sc., M.D., LL.D., F.R.S., F.R.S.C., F.G.S., F.G.S.A.	Ottawa, Ont.
Bostock, Hewitt	Monte Creek Ranche, Ducks, B.C.
Booth, C. Jackson	Ottawa, Ont.
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Batho, Geo.	Winnipeg, Man.
Baird, Thos.	Crystal City, Man.
Brown, Alex	Glenora, Man.
Barclay, Robt.	Winnipeg, Man.
Beavis, H. J	Crystal City, Man.
Burke, Rev. A. E.	Alberton, P.E.I.
Campbell, R. H.	Ottawa, Ont.
Costigan, Hon. John	Ottawa, Ont.
Creighton, Graham	Halifax, N.S.
Conant, Thos.	Oshawa, Ont.
Cochrane, W. F	Macleod, Alta.
Cochrane, Mrs. W. F.	Macleod, Alta.
Cowan, Wm.	Prince Albert, Sask.
Campbell, A. C.	Ottawa, Ont.
Charlesworth, L. E.	Rat Portage, Ont.
Cambie, H. J.	Vancouver, B.C.
Carpenter, H. S.	Ottawa, Ont.
Card, Mrs. Zina Y.	Cardston, Alta.
Carrol, Cyrus, C.E., O.L.S., D.L.S., District Engineer & Surveyor of N.W. Government.	Prince Albert, Sask.
Campbell, F. J.	Toronto, Ont.
Cavana, A. G.	Orillia, Ont.
Chipman, Willis, B.A. Sc., C.E.	Toronto, Ont.
Comstock, Prof. F.M., Ph. D.	Cleveland, Ohio, U.S.A.
Colter, James.	Crystal City, Man.
Caldwell, John.	Virden, Man.
Curtis, P. F.	Baldur, Man.
Campbell, Arch. M.	Ottawa, Ont.
Coltart, Ian.	Beulah, Man.
Davis, Hon. E. J.	Toronto, Ont.
Duff, Prof. J. A.	Toronto, Ont.
Dixon, F. FitzRoy.	Ottawa, Ont.
Davison, Frank.	Bridgewater, N.S.
Dickson, Robt. F.	Lacombe, Alta.
Deacon, Thos. R., M.E., O.L.S.	Rat Portage, Ont.
Dunlop, Wm. M.	Rockland, Ont.
Dicksor. Co. of Peterborough	Peterborough, Ont.
Daines, Orson A.	Cardston, Alta.
Ducker, W. A., D.L.S.	Winnipeg, Man.
Davison, E. D.	Bridgewater, N.S.
Dutton, Frank M.	Lachine, P.Q.
Davis, John, O.L.S.	Alton, Ont.
Dennis, J. S., D.L.S.	Regina, Assa.
Davies, Hon. Sir Louis, K.C.M.G.	Ottawa, Ont.
Engman, Frank L.	Scandinavia, Man.
England, D. D.	Winnipeg, Man.
Estlin, Alfred B.	Melita, Man.

MEMBERS OF THE CANADIAN FORESTRY ASSOCIATION– *Continued.*

Edwards, W. C., M.P.	Rockland, Ont.
Fletcher, Jas., LL.D., F.L.S., F.R.S.C.	Ottawa, Ont.
Flewelling, W. P.	Fredericton, N.B.
Fotheringham, Rev. John	Grenfell, Assa.
Farncomb, A. F.	Regina, Assa.
Fitzgerald, J. W.	Peterborough, Ont.
Fairbairn, Richard P.	Toronto, Ont.
Follet, Lee	Cardston, Alta.
Farmer, Fred. F.	Three Rivers, P.Q.
Frame, J. F.	Virden, Man.
Gibson, T. W.	Toronto, Ont.
Greeley, H. A.	Maple Creek, Assa.
Gifford, Prof. John.	Ithaca, N.Y., U.S.A.
Gamble, Capt. Killaly.	Toronto, Ont.
Galbraith, Wm., O.L.S.	Bracebridge, Ont.
Gillies, James.	Carleton Place, Ont.
Gillies, J. S.	Braeside, Ont.
Gregory, T.	Collingwood, Ont.
Gregory, J. Fraser.	St. John, N.B.
Goodwin, Professor W. L., D. Sc.	Kingston, Ont.
Greig, Geo. H.	Winnipeg, Man.
Graves, Professor H. S.	New Haven, Conn.
Greenway, John.	Crystal City, Man.
Goulter, H. H.	Virden, Man.
Halliday, James.	Quebec, P.Q.
Hingston, Sir Wm.	Montreal, P.Q.
Hamilton, Robert.	Grenville, P.Q.
Hay, G. U., M.A., LL.B., F.R.S.C.	St. John, N.B.
Hunter, S. H.	Pincher Creek, Alta
Hutt, Wm. N.	Southend, Ont.
Hutcheon, James.	Guelph, Ont.
Hammer, Josiah.	Cardston, Alta.
Harker, Levi.	Magrath, Alta.
Harcourt, Geo.	Winnipeg, Man.
Hamilton, Chas. A.	Baldur, Man.
Harrison, E. J.	Owen Sound, Ont.
Hosmer, Ralph S.	Washington, D.C.
Holmes, G.	Crystal City, Man.
Joly de Lotbiniére, His Honor Sir Henri, K.C.M.G.,	Victoria, B.C.
James, D.	Thornhill, Ont.
Johnston, T. G., M.D., M P.	Sarnia, Ont.
Jones, F. W.	Golden, B.C.
Irwin, Jas. M., O.L.S.	Rat Portage, Ont.
Ibey, Robert.	Cardston, Alberta.
Jory, U.S.	Crystal City, Man.
Ivens, C. E.	Virden, Man.
Johnson, Geo.	Ottawa, Ont.
James, S.	Toronto, Ont.
James, Walter J. T.	Rosser, Man.
Kilpatrick, Geo. B.	Toronto, Ont.
Keefer, T. C., C.M.G.	Ottawa Ont.
Kimball, Jas. R.	Magrath, Alberta.
Kimball, Earnest.	Kimball, Alberta.
Knechtel, A.	Ithaca, U.S.A.
Little, William.	Westmount, P.Q.
Leamy, Jas.	New Westminister, B.C.
Little, W. F.	Anthracite, Alberta.
Lyndon, W. A.	Lyndon, Alberta.
Lockhart, L. D.	Moncton, N.B.
Lumsden, Hugh D.	Toronto, Ont.
Lavallee, J. H.	Orillia, Ont.
Laidlaw, Jas.	Clearwater, Man.
Laurie, J. G.	Battleford, Sask.
McWilliams, J. B.	Peterborough, Ont.
MacLaurin, Alex.	Charlemagne, P.Q.
Mulvey, Stewart.	Winnipeg, Man.
MacKay, J. F.	Montreal, P.Q.
Macoun, W. T.	Ottawa, Ont.
Macoun, J. M.	Ottawa, Ont.
Macoun, Prof. John, M.A., F.L.S., F.R.S.C.	Ottawa, Ont.
Mackay, A. H., LL.D., B.Sc., F.R.S.C.	Halifax, N.S.
Matthews, R. G.	Macleod, Alberta.
McGibbon, Alex.	Fort Qu'Appelle, Assa.
Meyer, Miss L. W.	Calgary, Alberta.
Marker, C.	Calgary, Alberta.
McDonald, D. J.	Kamloops, B.C.

MEMBERS OF THE CANADIAN FORESTRY ASSOCIATION—*Continued.*

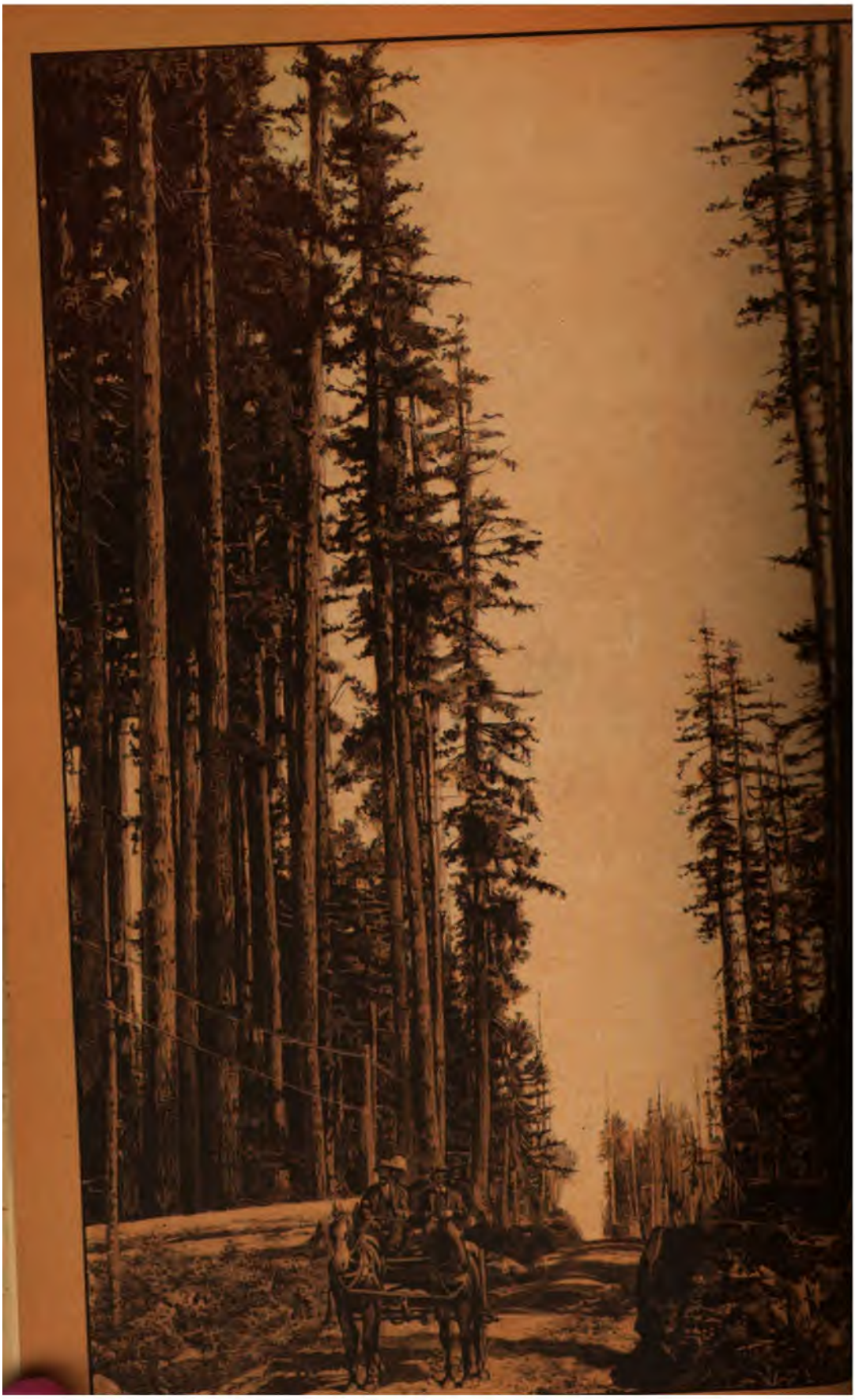
Mitchell, Arch	New Oxley, Alberta.
McInnes, W.	Ottawa.
Manitoba, Lt.-Gov. of	Winnipeg, Man.
McLean, J. K., D.L.S.	Elora, Ont.
McPhillips, G., D.L.S.	Windsor, Ont.
McAree, John	Rat Portage, Ont.
Mountain, Geo. A.	Ottawa, Ont.
Muldrew, W. H., B.A., D. Paed	Gravenhurst, Ont.
MacFarland, W. D., Ph. D.	Windsor Mills, Ont.
Murphy, J. E	Hepworth Station, Ont.
McPherson, Allan	Longford Mills, Ont.
McNab, Peter	Neepawa, Man.
Martin, Wm	Winnipeg, Man.
MacPherson, C. W., D.L.S.	Dawson, Yukon.
McKitrick, John.	Crystal City, Man.
McEwen, Findley	Crystal City, Man.
Menlove, J. F. C	Virden, Man.
McLennan, Francis	Montreal, P.Q.
McNamee, Jas.	Crystal City, Man.
McEvoy, J.	Ottawa, Ont.
Moore, Albert H	Andover, U.S.A.
Manning, S.	Crystal City, Man.
Niblock, J	Calgary, Alberta.
Noble, Wm.	Oxbow, Assa.
Needham, Walter	Cardston, Alberta.
Nichol, Josiah	Virden, Man.
Ogilvie, Wm.	Dawson, Yukon.
Orr, Wm.	Fruitland, Ont.
O'Hara, B. L	Lévis, P.Q.
Perley, Hon. W. D	Wolseley, Assa.
Pearce, Wm.	Calgary, Alberta.
Parent, Hon. S. N.	Quebec, P.Q.
Prince, P. A.	Calgary, Alta.
Pearse, B. W	Victoria, B.C.
Pinhey, C. H.	Ottawa, Ont.
Price, Herbert M.	Quebec, P.Q.
Proudfoot, H. B., O.L.S.	Toronto, Ont.
Porter, Jas.	Winnipeg, Man.
Parr, W. J	Crystal City, Man.
Potter, David	Clearwater, Man.
Pinkerton, Robt. T.	Westmount, P.Q.
Robinson, Hiram	Ottawa, Ont.
Ross, David	Whitemouth, Man.
Robertson, Henry	Collingwood, Ont.
de Rosenroll, Anthony, M.L.A.	Wetaskiwin, Alberta.
Rathbun, E. W.	Deseronto, Ont.
Ricardo, W. Granby	Vernon, B.C.
Robinson Lumber Company, Limited, The Fred.	Revelstoke, B.C.
Roche, John D.	Montreal, P.Q.
Ross, Norman M.	Ottawa, Ont.
Rutherford, Wm.	Montreal, P.Q.
Robertson, Jas.	Glencoe, Ont.
Ross, John	Cardston, Alberta.
Reilly, R. T.	Winnipeg, Man.
Ring, John J.	Crystal City, Man.
Ring, Robert	Crystal City, Man.
Rothnie, Jas.	Virden, Man.
Russell, A. L., D.L.S.	Port Arthur, Ont.
Rutherford, Andrew	Montreal, P.Q.
Reid, J. Lestock, D.L.S.	Prince Albert, Sask.
Rorke, Louis V.	Sudbury, Ont.
Riddell, Geo., M.D.	Crystal City, Man.
Saunders, Wm., LL.D., F.L.S., F.C.S., F.R.S.C.	Ottawa, Ont.
Stewart, E., D.L.S.	Ottawa, Ont.
Southworth, Thos.	Toronto, Ont.
Spring-Rice, Gerald	Pense, Assa.
Spring-Rice, B.	Pense, Assa.
Stupart, R. F.	Toronto, Ont.
Scott, Miss Mary McKay	Ottawa, Ont,
Schenck, C. A., Ph. D.	Biltmore, N.C., U.S.A.
Stewart, S.	Ottawa, Ont.
Sifton, Hon. C., K.C., M.P.	Ottawa, Ont.
Selby, Henry W.	Dinorwic, Ont.
Stewart, Geo. A., D.L.S.	Calgary, Alberta.
Speight, T. B.	Toronto, Ont.
Scott, James.	Toronto, Ont.

MEMBERS OF THE CANADIAN FORESTRY ASSOCIATION—*Concluded.*

Spencer, Mark	Cardston, Alberta.
Stoddard, Marion	Cardston, Alberta.
Spicer, H. H	Vancouver, B.C.
Snowball, Hon. J. B	Chatham, N.B.
Stead, Wm	Cardston, Alberta.
Shaw, Geo. H	Winnipeg, Man.
Schultz, Frank	Baldur, Man.
Stevenson, A. P	Nelson, Man.
Stephenson, E. F	Winnipeg, Man.
Saunders, B. J., D.L.S	Regina, Assa.
Stewart, Jas	Crystal City, Man.
Simpson, H. C	Virden, Man.
Stevenson, Dr	Virden, Man.
Stephen, Wm	Virden, Man.
Stedman, T. H	Macleod, Alberta.
Scott, Mr. Justice D. L	Calgary, Alberta.
Smith, J. P	Crystal City, Man.
Todd, F. G	Montreal, P.Q.
Turner, Richard	Quebec, P.Q.
Thompson, W. A	Pine Lake, Alberta.
Thomson, Geo	Orillia, Ont.
Toner, W. T	Collingwood, Ont.
Todd, Guy M	Westmount, P,Q.
Taylor, Hyrum	Magrath, Alberta.
Taylor, Clement	Winnipeg, Man.
Thompson, C. J	Virden, Man.
Ussher, C. E. E	Montreal, P.Q.
Vigar, Richard	Port Arthur, Ont.
Van Nostrand, A. J	Toronto, Ont.
Vroom, J	St. Stephen, N.B.
White, Aubrey	Toronto, Ont.
Westhead, Mrs	Lacombe, Alta.
Wilson, F. D	Fort Vermilion, Atha.
Wallace, Wm. S	Shellmouth, Man.
Warren, Col	Vancouver, B.C.
Wadsworth, V. B	Toronto, Ont.
Wallace, Jas. N	Hamilton, Ont.
Ward, Hon. J. K	Westmount, P.Q.
Wheelock. C. R	Orangeville, Ont.
Williamson & Crombie	Kingsbury, P.Q.
Waldie, John	Toronto, Ont.
Williams, Sterling	Cardston, Alberta.
Woolford, Thomas	Cardston, Alberta.
Woolf, John	Cardston, Alberta.
Wright, John	Cardston, Alberta.
Watts, Miss	Cardston, Alberta.
Wheeler, Hector	Regina, N.W.T.
Wilcox, David	Cardston, Alberta.
Wooley. O. A,	Magrath, Alberta.
Woodrow, W. H	Boissevain, Man.
Young, Hon. Finlay M	Killarney, Man.
Young, T. S	Toronto, Ont.
Young, Lee	Cardston, Alberta.

LIFE MEMBERS.

His Honour Sir Henri Joly de Lotbinière.
A. H. Mackay, LL.D.
Hiram Robinson.
W. F. Cochrane.
F. G. Todd.
F. D. Wilson.



CANADIAN FORESTRY ASSOCIATION

HIS HONOUR SIR HENRI JOLY DE LOTBINIÈRE, K.C.M.G.
Honorary President of the Canadian Forestry Association.

REPORT

OF THE

THIRD ANNUAL MEETING

OF THE

CANADIAN FORESTRY ASSOCIATION

HELD AT

OTTAWA, MARCH 6 and 7, 1902

OTTAWA
GOVERNMENT PRINTING BUREAU
1902

OFFICERS.

PATRON:

HIS EXCELLENCY THE EARL OF MINTO, GOVERNOR GENERAL.

HONORARY PRESIDENT:

His Honour Sir Henri Joly de Lotbinière, Lieutenant Governor of British Columbia, Victoria, B.C.

PRESIDENT:

William Little, Westmount, P.Q.

VICE-PRESIDENT:

Hiram Robinson, Ottawa, Ont.

VICE-PRESIDENTS FOR THE PROVINCES AND DISTRICTS:

Ontario.—J. B. McWilliams, Peterborough, Ont.

Quebec.—Hon. S. N. Parent, Premier of Quebec, Quebec.

New Brunswick.—His Honour J. B. Snowball, Lieutenant Governor of New Brunswick, Fredericton, N.B.

Nova Scotia.—A. H. McKay, LL.D., Superintendent of Education, Halifax, N.S.

Prince Edward Island.—Hon. Sir Louis H. Davies, Ottawa.

Manitoba.—Major Stewart Mulvey, Winnipeg, Man.

Assiniboia.—J. S. Dennis, Assistant Commissioner of Public Works, Regina, Assa.

Saskatchewan.—P. G. Laurie, Battleford, Sask.

Alberta.—William Pearce, Calgary, Alberta.

Athabasca.—F. D. Wilson, Ft. Vermilion, Athabasca.

British Columbia.—Hewitt Bostock, Ducks, B.C.

Yukon.—The Commissioner, Dawson, Yukon.

Keewatin.—The Lieutenant Governor of Manitoba, Winnipeg, Man.

SECRETARY:

E. Stewart, Dominion Superintendent of Forestry, Department of the Interior, Ottawa.

ASSISTANT SECRETARY AND TREASURER:

R. H. Campbell, Department of the Interior, Ottawa.

DIRECTORS:

Wm. Saunders, LL.D., F.R.S.C., Director of Experimental Farms, Ottawa.

Prof. John Macoun, F.L.S., F.R.S.C., Assistant Director of the Geological Survey, Ottawa.

Thos. Southworth, Director of Forestry, Toronto, Ont.

C. Jackson Booth, Ottawa.

W. C. Edwards, M.P., Ottawa.

C. E. E. Ussher, Montreal, P.Q.

E. G. Joly de Lotbinière, Quebec, P.Q.

NOTICES.

The Fourth Annual Meeting of the Canadian Forestry Association will be held at Ottawa, beginning on the first Thursday in March, 1903. Arrangements for special meetings may be made by the Executive Committee.

All membership fees should be forwarded to the treasurer, R. H. Campbell, Department of the Interior, Ottawa. The annual membership fee is $1 and the life membership fee $10. The membership fee includes a subscription to *Rod and Gun in Canada*, the official organ of the association.

ILLUSTRATIONS.

The illustration on the back of the cover of this report is from a photograph of a Canadian forest taken forty years ago. It shows the old type of shanty or 'camboose', as it was called, which formed both the sleeping and cook house of the lumberman, and was heated from a fireplace of earth in the centre. This type is becoming obsolete in Canada, but is of interest historically and also from the fact that it was a shanty of this class which was erected for the entertainment of His Royal Highness, the Prince of Wales, on his recent visit to the Capital of the Dominion. It shows the character of the lumber forest of forty years ago in Canada, and a number of the smaller illustrations in the text are complementary to it.

THIRD ANNUAL MEETING

OF THE

CANADIAN FORESTRY ASSOCIATION.

The Third Annual Meeting of the Canadian Forestry Association was held at Ottawa, in the Railway Committee Room of the House of Commons, on Thursday and Friday the 6th and 7th March, 1902. The meeting convened at 10 a.m.

Those present were: J. R. Booth, Thos. Southworth, E. Stewart, J. B. McWilliams, C. Jackson Booth, E. G. Joly de Lotbinière, Professor John Macoun, Dr. Wm. Saunders, W. R. Ross, H. C. Ross, T. S. Young, W. J. C. Hall, Robt. Gorman, A. Broder, M.P., Hon. L. G. Power, Dr. Jas. Fletcher, T. B. Flint, M.P., D. Lorne McGibbon, W. N. Hutt, Arch. M. Campbell, Geo. Johnson, A. A. Wright, M.P., Dr. Davies, W. T. Macoun, C. E. E. Ussher, C. J. Thompson (Virden, Man.), Roland D. Craig, Professor W. L. Goodwin, Otto J. Klotz, R. B. Whyte, J. G. Whyte, Hon. Senator Primrose, Mr. Spencer, F. W. Cowie, Hon. Sydney Fisher, Colonel Neilson, S. Stewart, W. H. Boyd, D. B. Dowling, Professor Robertson, Wm. Little, Mr. Drummond, Mr. Clark, E. Stewart, J. Keele, F. C. King, Max Rothkugel, A. Gibson, R. H. Campbell.

Mr. E. STEWART, Secretary.—Unfortunately this morning neither the president nor the vice-president is here. Our president is the Lieutenant-Governor of British Columbia, and it is impossible for him to be present. The vice-president, Mr. Little, of Montreal, telegraphed that he could not be here this morning, but hopes to be present in the afternoon. In the meantime we will have to elect a president *pro tempore*, and I have much pleasure in nominating Mr. Hiram Robinson to act this morning.

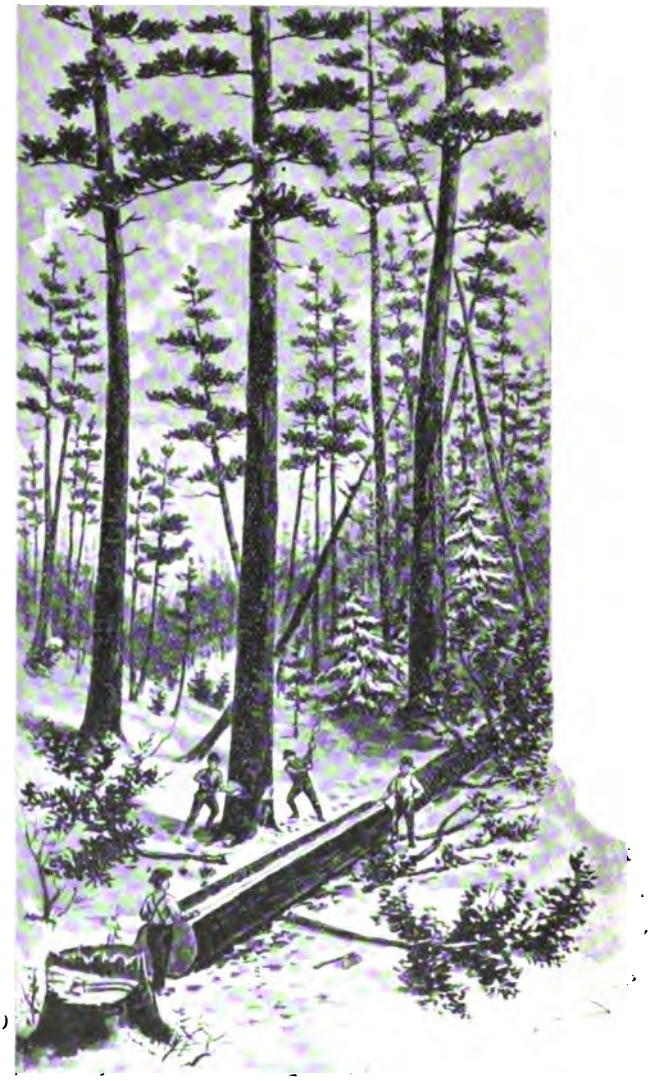
The motion was agreed to.

Mr. ROBINSON, having taken the chair, said:—Gentlemen, I esteem it a very high honour to be elected president *pro tempore* of this association, especially in the place of Sir Henri Joly, whose absence we very much regret. He is a gentleman who has done a great deal for this country in many ways, and especially in the matter of forestry. Although he has found it impossible to be here with us at this meeting, we know that he is with us in heart. I understand that he has sent a paper which will be read this morning by his son, and in due time it will be presented to us. I call upon the secretary to read the minutes.

The minutes of the preceding meeting were read and confirmed.

Mr. R. H. CAMPBELL, assistant secretary, read the reply from the secretary of His Excellency the Governor General, to the address of the association to His Majesty, as follows :—

'The address from the Canadian Forestry Association was duly laid before the King, and I am now desired by His Excellency the Governor General to inform you that His Majesty has been pleased to command that an expression of his sincere thanks be conveyed to the association for their sympathetic address.'



FELLING AND LINING

The secretary read letters from Mr. Gifford Pinchot, Chief Forester for the United States, and Col. Foster, Chief Fire Warden for Minnesota, expressing regret at being unable to be present. He also called attention to a number of specimens of British Columbia woods, which had been forwarded through the kindness of Mr. J. R. Anderson, Deputy Minister of Agriculture for British Columbia.

Mr. Stewart then read the report of the board of directors, as follows:—

Report of the Board of Directors.

The board of directors beg to submit their report of the work of the Canadian Forestry Association for the second year of its existence.

The following gentlemen were appointed by the board immediately after the meeting of the association a year ago as vice-presidents for their respective provinces and districts:—Nova Scotia, Dr. A. H. McKay, Superintendent of Education; Quebec, Hon. S. N. Parent, Premier of the Province; Ontario, Mr. J. B. McWilliams; Manitoba, Major Stewart Mulvey; Keewatin, His Honour the Lieutenant Governor of Manitoba; Assiniboia, Mr. J. S. Dennis; Alberta, Mr. Wm. Pearce; British Columbia, Mr. H. Bostock; Yukon, Mr. Wm. Ogilvie; and at a subsequent meeting of the Board, the following were elected, thus completing the list:—Prince Edward Island, Hon. Sir Louis Davies; New Brunswick, the Honourable (now Lieutenant Governor) J. B. Snowball; Saskatchewan, Mr. P. G. Laurie; Athabasca, Mr. F. D. Wilson. All of these gentlemen have kindly consented to act in this capacity.

The report of the last annual meeting was issued as soon as possible after the meeting, and three thousand copies were printed. Most of these have been distributed to members of the association, senators, members of the House of Commons and of the local legislatures, lumbermen, kindred societies, &c.

Your directors are pleased to report that the membership is steadily increasing, and now stands as follows:—

Provinces.	This Year.	Last Year.
Nova Scotia	6	5
Prince Edward Island	1	0
New Brunswick	9	6
Quebec	28	22
Ontario	117	89
Manitoba	73	50
Assiniboia	17	7
Saskatchewan	4	2
Alberta	58	44
British Columbia	16	12
Yukon	2	2
United States	15	5
England	1	0
Germany	1	0
Total	347	244
Life members	9	5

The revenue for the year ending December 31, 1901, was $454.60, and the expenditure $140.74, leaving a balance of $313.86. The liabilities for the year are greater than shown in this statement, as the account for subscriptions to the official organ was not received in time to be dealt with before the close of the year. The balance now standing to the credit of the association is $234.71, the receipts during the present year being $71.86, and the expenditure $150.90. The present outstanding liabilities, being principally accounts in connection with this meeting, are about $150, leaving a balance of $80.71. The unpaid subscriptions are $250, making $330.71 which will be available for the general work of the association during the present year, $175 of which, however, will be required to pay the subscriptions to *Rod and Gun*.

The board have continued the arrangement previously made with the publishers of *Rod and Gun in Canada*, and the matter for the space set apart for the use of the association in that periodical has been prepared by Mr. R. H. Campbell, the assistant

secretary, to the entire satisfaction of the board. An expression of the views of the members of the association in regard to the official organ and its editorial management will be welcomed by the board, as the effectiveness of this part of the work is of great importance to the success of the association.

During the past year the reports of forest fires in British Columbia and the great conflagration in the Temiscamingue district brought so prominently to the fore the question of the protection of the forests that your board considered it advisable that they should express themselves on the subject. A general resolution on the subject was therefore prepared and communicated to the governments of the various provinces, and a resolution urging the inclusion of an amended penalty clause in the British Columbia Fire Act was forwarded to the government of that province. To these resolutions very courteous replies have been received, and your board are of the opinion that their action in this respect has had a good effect.

In order, however, that the question might be brought definitely before the association, instructions were given that a report on the forest fires of 1901 should be prepared and submitted at the annual meeting, and such report will be presented accordingly.

The British Columbia Forestry Association is working in conjunction with this association for the more effective protection of the forests of that province from fire. It might be well, however, if some basis for closer affiliation between the two associations could be devised.

During the past summer the forestry branch of the Department of the Interior made a forestry exhibit at the Industrial Fair at Winnipeg, and at the Western Fair at Brandon, at which were shown certain varieties of tree seeds, leaves, young growing trees of different ages, and also sections of trees, some of which were grown under cultivation and others taken from the natural forest, varying in age from five or six years up to the neighbourhood of 200 years. The purpose was to afford an object lesson to the settlers of Manitoba and the Territories on the possibilities of growing trees in these districts.

The system of co-operation with the settlers of the western prairies in forest tree planting adopted by the Dominion government is developing into large proportions. Upwards of 500 farmers prepared their land last season under instruction from the agents of the forestry branch and will be supplied with seedling trees to plant shelter belts this spring. As these applicants are from all parts of the treeless section extending from the Red River to the Rocky Mountains, the results of their efforts will be an object lesson to the settlers in the whole plains regions.

The work of guarding the forests from destruction by fire has, from all reports, been attended during the past season with very gratifying results wherever it has been vigorously prosecuted.

In Ontario the recent report of the chief of the forestry bureau is to the effect that the loss of timber on the Crown timber lands of that province has been very small.

On Dominion territory, especially in the railway belt in British Columbia, the work done by the forest fire rangers during a long drought last summer was very effective. In some cases the fire was fought day and night for weeks, but the report of the crown timber agent who had charge and direction of the work shows that through their efforts the aggregate of damage was not large, but he adds that had it not been for the good work done by these rangers, and the way the country was looked after by them, they would have had fires equal to those on the American side, which destroyed a large quantity of timber just across the line.

The reports received from those in charge in the timbered districts in Manitoba and the Territories also show that through their efforts and those under them, the fires started during the dry part of the season were generally kept under control, and thereby much valuable timber was saved from destruction.

In the province of Quebec, however, unfortunately the measures taken were not effective in preventing a serious loss in the Temiscamingue district. While this serves to emphasize the fact that there are weaknesses in the means so far employed in Quebec, and therefore that province must submit to being held up in many a forestry sermon as a warning example of the destruction that is caused by fire in the forest, it

must not be overlooked that the same danger from the same cause threatens the forests in every part of the Dominion.

In New Brunswick the government and the lumbermen are taking up seriously the work of forest protection with good success.

In Nova Scotia an agitation has been carried on steadily throughout the year and it is hoped that in the near future some steps will be taken in the legislature and outside of it to make the forests a greater factor in the wealth of the province. With the object of assisting this work it is proposed to hold a forestry meeting at Halifax in the near future.

In Prince Edward Island efforts are being made to arouse an interest in forest protection, and during the last session of the legislature a Forest Fire Prevention Act was passed. If the efforts are crowned with success it is hoped that the forests will be put in charge of a commission.

There is no question that the fire ranging service is one that should be fully developed by those in charge of the public timber domain, whether Dominion or Provincial. As has been frequently pointed out, the work done by those patrolling the districts can never be fully ascertained, owing to the fact that their duties are largely preventive, but any comparisons that have been made between a period of years where no guarding was done with another where it was in force prove conclusively that no expenditure of public money can be more judiciously employed than that used in defraying the expenses of an efficient fire patrol service on our public forests.

It was considered advisable that the Game Protective Associations should be induced to take an interest in the protection of the forests as the home of the game animals and the regulators of the flow of fishing streams, and the officers of the North American and Quebec Associations for the Protection of Fish and Game have been communicated with. Replies have been received that these associations will be glad to second the efforts of the Forestry Association as far as possible.

A special letter was also sent out to the lumbermen, calling their attention to this meeting and the work of the association, which has resulted in quite an accession to our membership.

Your directors, inclosing, desire to congratulate the association on the representative character of its membership, and also on the lively interest in the forestry problem that it is fostering in all parts of the Dominion.

ROAD CUTTERS.

They also have again the pleasing duty to bear witness to the very liberal assistance that the association has received from the railway companies of the country, from the press, from sister societies both here and in the United States, and from the Department of the Interior.

Mr. R. H. CAMPBELL read the treasurer's report, which showed receipts of $454.60, including a balance of $175.15 from the previous year, and expenditure $140.74, leaving a balance of $313.86.

Professor MACOUN moved that the treasurer's report be adopted, and that the same auditors who were appointed last year, Messrs. Geo. Johnson and J. M. Macoun, be re-appointed.

The motion was agreed to.

Professor MACOUN moved that the directors' report be received and adopted.

Mr. A. C. CAMPBELL—I feel personally grateful, as a member of the association, for the work that has been done, and appreciate very highly the full and clear report the directors have presented. My object in rising is to express this opinion, and to ask what steps are being taken to increase the membership of the association. We have, as the directors say, a widespread membership, and of a very representative character, but I think my question is not clearly covered by the report, and I should like to know what steps are being taken to extend the membership.

Mr. E. STEWART, Secretary—In the first place, we have recently written to all the prominent lumbermen in the country, sending them our last year's report, and asking them to become members. We have also made up a list of parties all through the country to whom this year's report shall be sent. In addition to that, we have tried to keep the matter before the public as much as possible in the press, and I had hoped that we would have had more meetings in the country. We tried to get one in Halifax. We also tried to get one in Montreal, but did not consider it advisable to have it this winter, our meeting here being so near the same time. If there can be anything suggested by which we can do more than we have done, we should be very glad to hear it, but the membership is gradually increasing. There is one thing about the membership of the association—it is of the most representative character. From all parts of the Dominion we get additions in the most unexpected quarters. The other day we received a letter most unexpectedly from a person wishing to become a life member. He is unable to attend the meeting of the association to-day. The interest is constantly increasing. If anything can be suggested beyond what we have done, we should be very glad to hear it. We have done nearly everything we could that we were able to accomplish.

Mr. THOMAS SOUTHWORTH, Director of Forestry for Ontario—I do not know what steps the directors of the association have taken with reference to extending the membership, and they may have covered the point to which I wish to refer. I think if a circular letter was sent to each member of the association, with a blank form, requesting them to submit to the secretary a list of names of friends of theirs who might possibly be induced to become members, to whom copies of the annual report and other information should be sent, it might be successful. That plan has been adopted by some United States associations of a similar character, and I think with considerable success. I know I am frequently asked to submit names to several societies in the United States. I do not know that that has been done by our association.

Professor MACOUN—I wish to say a word for the directorate. It is the modesty of the directors that has prevented them putting anything on this subject in the report. They have used all imaginable efforts to increase the membership, but the supineness of the public is so great on this, as on many other matters, that it is nearly impossible to wake them up. Mr. Southworth's suggestion is an excellent one, and if it has not been done—I think it has—certainly the coming directorate will second the efforts of the past and will see that we have a larger meeting next year than we have to-day; but the directorate have done everything in their power to increase the membership, and you will see by the report that it has increased in every province. That is a good thing to be able to say for the year.

Mr. GEORGE JOHNSON—It appears to me that we ought not to have such a large balance as $234 at the end of the year for a society like this. There ought to be some

means adopted to keep the expenditure up to the receipts, or a little beyond the receipts, if necessary. We might do more in the way of distributing leaflets and that kind of thing. The money should be expended in a way to rouse up the supine public that my friend speaks of, and I do not know any better way than by using the leaflet system, such as they are using in many organizations in the United States. *Rod and Gun* is doing very good work with a very limited circulation, I imagine, but we want more than that, we want to stir up the public all over the Dominion. The only way to do that, with a body of men such as we have here—prominent men in different parts of the country—would be through the good old system of tracts, and I should like to know to what extent the directorate have developed the idea of arousing the public in that way.

Mr. R. H. CAMPBELL—Our balance is shown as $234.71 at present in the bank, but we have considerable liabilities still. We have the liabilities in connection with this meeting, which I have calculated at about $150, which will take something off the balance. I calculate after paying expenses we will have about $80 left. We cannot count on the amount shown in that balance as free for extending the work of the association. The suggestion made by Mr. Johnson is a very good one, and it is a matter that has not been altogether overlooked by the directors, but we have not up to the present, just found the way clear to issue leaflets in the manner suggested. In the first place the material has to be prepared, and we have not as yet found the means to make arrangements for the preparation of it. Possibly some of the papers to be presented at this annual meeting might be put into the form of the leaflets, if it is thought better to extend the circulation more widely than will be done in annual report. In that way something might be done, but if we are going to distribute leaflets, we must, in the first place, have good, reliable and effective material in them, and that means that somebody must prepare them. In the second place, we must have money to pay for sending them out, and I do not think we will have very much to devote to that purpose. I should like to call your attention particularly now to *Rod and Gun*. I suggested to the secretary, when preparing the report of the board of directors, that he should make reference to it and ask that there should be some discussion held on it. You understand pretty well what we are trying to do, but perhaps a statement of it might bring out some features of the question that have not received attention. You understand the extent of our association, reaching all over Canada; you understand the diversity of interests to be considered; we have Nova Scotia, New Brunswick, Quebec and Ontario, we have the great plains of the West, and we have British Columbia, and all of these we are supposed to touch in a very small department in *Rod and Gun*. It is not a very easy matter to carry on the work so as to reach all those different parts and give them proper attention, and see that our members are informed of what is going on. The officers of your association do not have a great deal of time at their disposal to attend to these things, which are outside of their official duties altogether, and it would be a very good thing if the members of the association would keep this matter in mind—the members of the association throughout the whole of Canada—and assist the editorial work as far as it can possibly be done. There is another thing. I should like to have the official organ discussed with some fullness. You understand what *Rod and Gun* is. It is not a forestry journal, it is a sporting journal primarily, and the management of *Rod and Gun* prefer that contributions to the forestry department should bear, to a certain extent, on the objects which that journal has in view. They are not so much concerned with matters that purely relate to forestry, or matters that are at all tech-

nical, and there has been a slight difference of opinion occasionally between myself and the manager of the paper on that point, so that I should like to have the matter fairly discussed at this meeting so that we will understand our position in connection with the official organ, and if there are any suggestions that could be made as to the improvement of it, or as to any change that would be desirable, I think it would be very helpful to us if they were presented now.

Mr. GEORGE JOHNSON—What circulation has *Rod and Gun?*

Mr. CAMPBELL—There are five thousand copies issued every month, but *Rod and Gun* is largely an advertising medium as well as a subscription paper, so that I cannot tell just how many subscribers they have, but five thousand copies are distributed every month throughout the United States and Canada.

Mr. E. STEWART—The difficulty seems to be to get a paper that would suit all parts of the country. Now, in Manitoba and the West they would prefer a purely agricultural paper; they have told us that. If we took up space in one of the Manitoba papers, it would not reach the East at all, and if we proposed to take some eastern paper it might not reach the West, so we have to try and take something that will be read in all parts. No doubt, in the prairie country we could get a paper that would be of great service to the people there, and so in British Columbia, but it would not reach here at all. That is one difficulty we have.

Mr. GEORGE JOHNSON—*Rod and Gun*, I understand, is a railway paper, and its great object is to induce people to travel by a certain road for the purpose of shooting and fishing, and its circulation in that case must be largely among people who take no interest in Canadian forestry as such, and it is on that ground that I should like to have this thing well threshed out, so as to see whether we should spend so much money for the five thousand copies of *Rod and Gun*, only a very small portion of them circulating among the people we wish to reach, or whether it would be better to spend that money in the publication and distribution of leaflets and other things.

Mr. SOUTHWORTH—I remember quite distinctly the discussion that took place at the time it was decided to adopt *Rod and Gun* as the official organ of the association. I do not think any regard was had then to the circulation that the paper might have had. It was adopted as a means of reaching our own membership. There are two or three forestry papers published in the United States which are the official organs of forestry associations, which do not reach anybody except the members of the association, and that was our idea, I think, when adopting *Rod and Gun* as being the only available paper that we knew of at that time, but it was distinctly understood that the forestry editor was to have absolute control of the space given to the association, and I do not think there should be any difference between Mr. Campbell and the manager of the paper as to the forestry column being under Mr. Campbell's control. If he is not to absolutely control the columns through which we attempt to reach the members of the association, we had better cancel the arrangement, though I have not any better suggestion to make. I do not know of any other paper issued at present that would reach the people we want to reach any better. *The Canadian Lumberman* is read by a great number of people we wish to reach, who do not read *Rod and Gun*, but I do not know whether we could make any arrangements with a paper of that sort, whether they

would be willing to give us space; but there should be no question about our absolute control of the forestry columns. That was the distinct understanding.

Mr. YOUNG—I might say, on behalf of *The Canadian Lumberman*, that we did not anticipate any change. The matter was not discussed before I left Toronto; therefore, I am not in a position to say what we could do in case the association decided to make a change, but my own opinion is that some arrangement could be made which probably would be satisfactory to both parties; and I might say further, that if it is not decided to make any change, we shall be very glad to assist the association in any way we can, by giving a certain amount of space each month to the forestry question. Whether the matter for that space should be furnished by the association or supplied by ourselves is a subject on which I should like to have an expression of opinion.

Mr. E. G. JOLY—As a means for securing the best material for publication in *Rod and Gun*, material that might be of general interest all over the country, do you not think, Mr. Chairman, that at a meeting of this kind if a certain number of gentlemen would undertake to write each an article for publication in that paper, dealing with the forestry question in whatever sections of the country they might come from, that that might be a very good way to secure valuable material for publication? For instance, a man from the West can write up the forestry conditions that need the most looking after in the West, which would be of general interest to people in that section of the country. Then a gentleman in the East could do the same for that part of the Dominion, and so all through Canada. It is very difficult to get a paper that would be of general application to the whole country, the conditions are so varied, but by having a particular paper, one each month, dealing with the conditions that might be found in some section of Canada, good work could be done, if gentlemen would take up these matters, and *Rod and Gun* would insert such articles without question.

Professor MACOUN—Mr. Southworth is quite right; it was never intended, when we discussed *Rod and Gun*, that it should be a public organ; it was to be an official organ. It was to go to the members of the society. This is a broader question than we discussed; it is giving it to the public. Every member of the society gets a copy of *Rod and Gun*, and hence gets what is written by the editor or the secretary for publication. The public were not included in the arrangement at all. If the public are to be included, it widens the question.

Mr. JOLY—We want to reach the public.

Professor MACOUN—That was not the intention at first.

Mr. R. H. CAMPBELL—*Rod and Gun* is a very useful paper for reaching those interested in sport, and I think it does a great deal of good in that way outside of the use it is to our membership, and there might not be any other paper we could get that would any better reach the interests we try to reach; but I thought it advisable that we should have the matter discussed, because I find it a somewhat difficult thing always to get just the material that is suitable, and also to meet the wishes of the publishers as expressed to me. I try to do it as far as I can. I wrote the manager of the paper decidedly that our position was that so much space was allowed to us in *Rod and Gun*, and that they were to accept and publish the material that we sent, to which he assented, but I thought it was much better that the association should take up the matter and

define exactly how we stand, so that in communicating with *Rod and Gun* again, when necessary, I would have the support of the association in what I might say.

Mr. A. C. CAMPBELL—In asking what was being done to extend the membership of the association, I omitted to say what I had intended to state in rising, that I recognized fully the work that the directors had done in this particular matter, and that I recognized also what they have achieved in extending the membership of the association. What Professor Macoun says with regard to the attitude of the public on this question is perfectly true, but it is likewise true about the public's attitude on every other question. It takes a great deal of advertising, missionary and propagandist work to get the public interested in anything whatever, and it seemed to me, in asking the question what was being done to extend our membership, that I asked a question which was vital, not merely to this association—for that is a small matter—but vital, from the point of view of this association, to the question of forestry in Canada. This is a Dominion association devoted to the great national work of preserving and restoring our forests. The secretary has mentioned from what unexpected quarters our membership comes. I am, myself, an example of that kind of thing. I know almost nothing about forestry; I have no possible direct interest in the business of preserving or growing forests; I have nothing to do with the thing whatever, but I recognize the fact that upon the preservation of the forests depends the very life of our country. That seems to be so perfectly obvious that I am sure if the thing were presented to the people, enough of them would see and understand to have the effect that we desire to achieve. This association, as far as it itself is concerned, would be willing to go down if the objects of the association were attained. The preservation of the forests is the object we have in view, and our organization is only a means to that end. It seems to me that the extending of our membership is the one vital question, and the means that have been taken I believe have all been good and useful and to a degree effective, but perhaps more could be done. This is, after all, a propagandist question, an advertising question, and it seems to me that this association should place in the hands of its directors this special business of advertising the work that the association has to do, with a view to interesting the public in it, or else that they should have a special committee—what might be called the college of the propaganda—for the purpose of spreading ideas for the dissemination of which we are banded together. As to *Rod and Gun*, I do not see how any better choice could have been made. Although there is ever so much in the paper that is not interesting to me, I read the forestry department, and am glad to read it, and I believe the same is true of every member of the association, but there are two objects in view—there is the great public outside to be reached, and the question of keeping our membership informed of what is to be done, and of getting new members, it seems to me are two different questions, and these cannot be settled by a discussion such as we are carrying on to-day, but should be settled under the direction of some committee of our own. I do not see why the directors should not take that as one of the first objects of their existence; or if the directors have too much other work on their hands, or the thing is deemed of sufficient importance, we might have a special committee on that subject to consider it, and at the next meeting of the association to report to us some scheme, not merely of having a column in the paper and informing our members of what we are doing, but carrying on the propaganda in the interest of forestry in Canada.

Mr. E. STEWART—We have reason to be gratified at the success of this association, rather than otherwise. A little over two years ago, after attending the meeting of the

American Forestry Association at Washington—and I do not think there was a larger number present there than we have here this morning—it occurred to me that we might possibly be able to form a Forestry Association in Canada, and the way the public have taken hold of it has been a surprise to me. You cannot measure the usefulness of this association by the extent of its membership; certainly you cannot by the number attending the meetings. If you could see the correspondence that we have from all parts of the country you would realize that the country is becoming awake generally to the necessity of giving greater attention to the protection of timber in the forest districts, and also with reference to tree planting on the plains. It is evident that the public is advancing, and advancing pretty rapidly too, on those lines. With reference to increasing the membership of this association, we have sent out circulars. As this association is a new thing we generally have to say that we do not belong to the Independent or Ancient Order of Foresters—that is the first thing—but if we could have our annual report sent out inviting, as we have already invited, applications for membership, sending with it an envelope directed to Mr. Campbell, I do not think you could have a better way of increasing the membership. If we could afford to print more of those annual reports it would be the best way we could adopt to bring it before the public. We have, through the kindness of the department of the interior, printed 3,000 last year, and we are printing 3,000 this year. We distributed nearly all of them last year, and they are sure to be pretty well distributed also this year. I just rise to say that the public is interested already, and that the benefit is not to be measured by the extent of the membership. Regarding *Rod and Gun*, we are very glad to get the views of those who have spoken on the subject, and no doubt those views will be considered by the directors. I do not know whether it would be wise to have a special committee. You all know the difficulty of getting committees together. It is generally left to a few, and it will have to be considered carefully what we shall do. It is hard to decide here this morning, and I suppose we should not waste much more time over it, unless some one wishes to speak differently on the subject.

Hon. Mr. POWER, Speaker of the Senate—I am a total outsider, but with your permission I should like to say a word with respect to increasing the interest of the public in the work. The public as a rule do not read *Rod and Gun*; I regret to say that, as a general thing, they do not even read your report, but they read the principal newspapers all the time, and if you wish to interest the public at large, and to influence legislators, the best way to do it is through the columns of the principal newspapers in the different provinces. There is another way—by undertaking an active propaganda making speeches through the provinces; but I do not suppose the association is prepared to do that. As a matter of business, the object should be to try and secure the insertion in the principal newspapers of the different provinces of as many articles on forestry as you can get. Such articles appear now, and I think the readers of those papers take a good deal of interest in those questions.

Mr. FLETCHER—Newspaper editors generally like to use their discretion as to whether they should publish an article or not. I would like to ask Mr. Campbell to what extent the articles in *Rod and Gun* are copied in the newspapers.

Mr. R. H. CAMPBELL—Some newspaper men have told me that they have occasionally made use of such papers as they considered suitable. We have occasionally, too, tried to have contributions appear in the papers. Of course there is the difficulty I

mentioned before. If we are going to have this material appear, it must be prepared—it must be good material, and there must be somebody to prepare it; that is the difficulty. *Rod and Gun* practically takes up all the time I have to spare. For newspaper work it would really need some one else to prepare the articles, unless those which are published in *Rod and Gun* are copied in the newspapers.

Mr. D. LORNE MCGIBBON—I have been a member of the American Forestry Association for some years, but have only recently become a member of the Canadian Association. Until a short time ago I was not aware that there was such an association in Canada, although I had been a member of the Pulp Association for a few years. It seems to me, if each member of the association would try in his own neighbourhood to get as many members as possible by speaking to those who should join it—I do not mean the public at large, but those interested in forestry—a larger membership could very easily be secured.

Mr. R. GORMAN—We might make a change from *Rod and Gun* to some other paper. Of course, it would be better to have these articles published in every province; that would be the best way to reach the greatest number effectually. If that would involve too much expense two or three of the commercial papers would reach all the provinces. For instance, the *Monetary Times* is read by the commercial people generally and by the best class of people in the country—the people most interested in promoting the object that we have in view.

SWAMPING OUT

The CHAIRMAN—We are very glad to get the views of the different members of the association, and I am sure it will be the duty and pleasure of the directors to consider all the points that have been brought before them to-day with a view of extending as far as possible a knowledge of the forestry association. I might say, to my own knowledge, our secretary, Mr. Stewart, and the assistant secretary, Mr. Campbell, have been working very hard, in season and out of season, to extend a knowledge of the association throughout the whole Dominion. As an association we have great reason to feel thankful for their efforts, and with the help we have received from the Dominion Government we hope to extend more widely the influence of this association. Any one who has read the report of 1901 can see the work that these gentlemen have been doing. The report could not have been prepared in better shape than it is. I may say it is really a work of art and it is a pity that the people of Canada should not have a greater

knowledge of what this association is accomplishing. I am glad to say, as Mr. Stewart has already told you, that the work which has been done is commencing to tell, but it should be the duty of this association to drive it home, in season and out of season, as far as possible. As members of this association it is your duty to help the committee in every way by sending in names and offering suggestions to help the work forward. As the discussion has gone so far, we will be obliged to put the resolution as it stands for the adoption of the report.

The motion was agreed to.

The CHAIRMAN—The president, Sir Henri Joly, is not present, but he has sent a paper, which his son will read to us this morning.

Mr. E. G. JOLY—I must thank you for the sympathetic allusions which you have made to my father. All I can say is that it would be one of the happiest moments of his life were he able to be with us here this morning, and to take part in the present discussion. The paper which I will read to you is necessarily very short. His experiences only extend over thirteen or fourteen months, but I am sure that if he is spared to remain in the west for some time longer, we will hear again from him on the subject of our eastern exiles which have been transplanted to the Atlantic coast.

EASTERN FOREST TREES GROWN AT VICTORIA (B.C.) FROM SEED.

HIS HONOUR SIR HENRI JOLY DE LOTBINIÈRE.

Lieutenant Governor of British Columbia.

It may be found interesting as well as useful to see how our eastern trees will thrive in British Columbia, and to compare their annual growth and the length of the growing season in British Columbia with their growth and the duration of the growing season in the East.

For that purpose I procured from the East seed of the butternut, black walnut, red oak, ashleaved maple and green ash, and sowed them in the government garden at Victoria in the autumn of 1900.

Owing to my absence from Victoria during the following spring of 1901, I cannot determine the exact period at which the young trees came out of the ground, but on my return at the beginning of June, I found them much more advanced than they would have been with us in Quebec, certainly more than two weeks; and in the autumn their growth was prolonged, in average, about three weeks more than at Quebec.

As their size here is about the same as it would have been at Quebec, where the growing season is at least one month shorter, I conclude that the difference is accounted for by the greater degree of heat of our Quebec comparatively short summers.

The success of this first experiment was very satisfactory, especially considering that a certain portion of the nuts only germinate the second year, in the present case next spring.

During the first summer, out of 174 butternuts sown 113 came up. Out of 120 black walnut sown 68 came up. Out of 103 red oak acorns sown 83 came up. The 160 seeds of ashleaved maple only produced 48 trees.

Altogether I consider the result as satisfactory, especially if, as I expect from what happens in the east, some more nuts come up this next spring.

Out of 247 seeds of the beautiful large leaved maple (*Acer macrophyllum*), sent me from the Park of Vancouver, 200 came up, which I propose sending to the East, as they are not found there. Some of the leaves of the mature tree are from 18 to 20 inches in width.

It would appear that the conditions of successful growing of trees from seed are more favourable on the Island of Vancouver, or at all events at Victoria, than on the mainland of British Columbia.

I was warned by people who had experience from the conditions on the mainland, that it was no use sowing the seed in the fall, as it would rot in the ground owing to the frequent rains, which I have not found to be the case. The fact is that it requires that rain to open the nuts. That work is performed for us in Quebec by the winter frost.

During the last summer I sowed eucalyptus, elm and deodar seed, which came up satisfactorily, but it was too late in the season to form an opinion as to what the whole season's growth would have been.

Fifty-two acorns from a young English oak on Sir Henry Crease's grounds gave 42 trees. The best growth of all during this first summer of 1901 was from the almonds sown in the autumn of 1900. One of them reached a height of 54 inches and went on growing until the end of October. When the spring comes it will be interesting to see how it has stood the winter.

The most valuable tree that we can grow here, the wood from which on the London market often brings as high a price as mahogany, is the black walnut. There is no doubt that we can grow it successfully, and it grows more rapidly than either our eastern pine or white spruce.

Wherever the necessity is felt for restoring the forest, where it has been so improvidently destroyed, as has been the case in our eastern provinces, Quebec, Ontario and others, and as will be the case in British Columbia if we are not careful, I would recommend the cultivation of the black walnut in preference to any other tree.

Mr. E. G. JOLY—I happened to be in British Columbia for about six weeks last summer, and had the pleasure of assisting my father in looking after his little nurseries and plantations of trees. The great trouble we had there was the watering. It is a very dry country, as most of you gentlemen know. You have periods of three or four weeks, and sometimes more at a time, when there is absolutely no rain and hardly any dew. In this case the drought extended over six weeks last summer. Not a drop of rain fell, and those droughts can be looked forward to invariably during certain periods of the summer. The trouble is the extensive care and watering that these young trees require, and naturally, if one is planting nurseries on a very large scale, that would be a very serious question. I know in our plantations, limited as they were, we had to have hose sprinklers playing on the little trees for hours every day during the summer. The soil is of such a marvellous nature that if you do give them the slightest amount of moisture they grow perfectly well. But that is the great trouble. We have to give them care which we are not called upon to give them in the eastern portion of the country. However, it can be done, and done successfully, with the proper care and attention.

Dr. WILLIAM SAUNDERS—I have listened to this paper with very much interest. I also had the pleasure last summer of visiting Sir Henri, and enjoyed, with him, looking over the little nurseries which he has so successfully started, and which are making such rapid growth. I may mention that my experience in growing the eastern trees on the Pacific coast extends over a longer period. In the winter of 1886, when I first visited British Columbia, I was very much struck, in investigating the character of the woods, with the almost entire absence of hardwood on the Pacific coast. *Acer macrophyllum*, the maple to which Sir Henri Joly has referred, is practically the only hardwood tree which grows native there, and it is not a very common tree, although it is found in considerable areas here and there. But that is the only wood which the lumbermen have upon which to draw for making articles of furniture, and portions of buildings that require hardwoods in their construction. Outside of that there is the crab apple tree,

which sometimes grows to a diameter of five or six inches, and is used for handles of tools occasionally, but practically there is no other hardwood than that. It occurred to me as an important matter if we should, in connection with the experimental farm, begin a series of experiments at once to determine how far the hardwoods of the East would grow satisfactorily in the climate of British Columbia; and as they have an unlimited area in their hillsides and mountain elevations for the growing of trees, there is no end to the extent to which this might be carried with advantage to the country. The first experiment was in sending out a quantity of black walnuts. Four or five bushels of black walnuts were sent out, and about the same quantity of butternuts, and these were experimented with by the superintendent of the experimental farm on the mountain sides at the rear end of the farm. Many of them were stolen by the squirrels and other small animals which abound there, but a great many of them came up notwithstanding, quite a large proportion. We sent out also some thousands of black walnuts, butternuts, hickories and elms, and also some of the eastern oaks and ash, indeed all the hardwoods that would be likely to be useful to that country, and in the course of two or three years we succeeded in planting about 20,000 in all on the hillsides in the rear of the cultivated grounds on the experimental farm. These have some difficulties to contend with that did not strike us at first. Those of you who know British Columbia are aware that the fern, bracken or species of growth very closely allied to the bracken of this country, is the worst weed which people have to contend with everywhere. Down our mountain side we have frequently had these bracken growing to twelve, thirteen and fourteen feet so that one can walk about among them and lose himself very soon if he gets out of the regular track. These ferns have grown up with the forest trees, and it has been a struggle for eight or ten years to know which would have the mastery. The young trees have been so shaded during the season of the growth of the ferns that they have not been able to make the headway they otherwise would have made. I am pleased to be able to say that now, after eight or ten years, they have grown above these ferns and any one visiting British Columbia would be gratified to see the different kinds of foliage on the mountain side becoming more and more conspicuous each year. Besides this, planting has been done indiscriminately, by the superintendent and staff of men climbing the mountain side and placing trees here and there, wherever they can, without taking regard to where they have gone, because that would be impossible. The mountain sides are difficult to climb, and, besides that, a number of specimens were planted and it would be impossible to keep count of them. We did, however, start a plantation on the lower side of the mountain, in the valley, which can be inspected at any time, and there we find that black walnuts planted about eleven years before are about thirty-five feet high, with quite large trunks, I would not like to venture to say how large, but I think they are eight or nine inches three feet from the ground. They have made very good growth indeed, showing that black walnut will thrive in that country, and the butternut also has made equally good growth. Success has also attended the white pine and oak, and some other valuable trees on the plantation on the lower level. I have had the pleasure of visiting the place every year for the last ten or twelve years, and it has been very gratifying to see the progress that has been made. There is one point that occurred to me as perhaps a drawback in the growing of hardwood there and I am glad to know that the opinion I first formed is erroneous. I thought perhaps with the rapid growth that the hardwood trees make in that climate—indeed they all grow rapidly—that the wood would be less tough and valuable, but on consulting with Dr. Fernow, whom we expect to have with us to-day, he

informed me, that in Europe the rapidity of the growth had no bearing on the toughness of the wood. We know that second growth hickory is quite as tough as first growth, if not tougher. So I feel pleased with the progress this work is making, and I would like to see it very greatly extended indeed, because I think it is one of the most important things in connection with timber growing in British Columbia to introduce in a large way, if possible, the more valuable trees of the East into that country, where the growth is so rapid and where we may expect within a reasonable time to see large groves of useful trees growing. We are greatly indebted to Sir Henri Joly for bringing this subject before us, and for the interest and enthusiasm which he always puts into everything he undertakes. I hope the friends will bear in mind to look at the specimens sent here through the kindness of Mr. J. R. Anderson. I think it will be the duty of our friends to show the specimens to those who have not seen them.

Professor MACOUN—I wish to make a remark or two in regard to this paper. With reference to watering walnut trees, many people may not be aware that the Pacific Coast climate is different from the climate here in this regard that the air may be apparently perfectly dry, no rain may fall for months, and yet the air is at the point of saturation all the time. What I mean to say is this : that when the rainy season ceases, about the beginning of May or later—sometimes it runs on to June—not a drop of rain will fall for weeks, and the sun pours down, and the people think it is dry. But I know it is not. I have had to dry plants there and I have learned that you cannot dry plants in that atmosphere with the amount of drying that the sun will do. What I wish to say is that in the young state, when these young trees come up, watering is necessary—no doubt about that,—but after they get their tap root down, it is not necessary. This coming year, if there should not be a drop of rain for two months, those trees would grow perfectly well. You will see that. It is not a prophecy; it is a fact. The British Columbia climate is of this nature; that the rains pour down from the beginnning of September. When I say pour, I always say that the rain in British Columbia is not wet, because if you have a thick woollen coat on and you give it a good shaking, like a water dog you are clear of water; simply because the clouds are so low and it comes down gently; and it is just the kind of rain we like here,—Scotch fog, or something stronger. In the dry season, just what the gentleman who read the paper states, it is perfectly dry, apparently, but in reality the atmosphere is moist. Another point that is worth speaking of, the whole Pacific Coast from the southern point of California to Alaska, is covered with a coniferous forest, except in California where there are no trees, but you will understand the forest of that part of America is coniferous, consisting of pines and spruces and so on. That does not prohibit the growth of hardwood. It simply means there are no hardwood trees there, any one who has seen those mighty broad-leaved maple trees and the oaks out there will say at once that there is nothing to interfere with the growth of deciduous trees, hence every experiment will be successful. You will grow everything on that coast that is required to be grown in the nature of hardwood, and it will be absolutely successful, and what is more, the growth is something astonishing. Think of a climate where this very year strawberries were ripe on the 22nd of January, at a place near Victoria. Think of it where there are sixty or seventy species of wildflowers in bloom at Victoria. The strawberries were ripe last year coming into spring, but I have found strawberries ripe and, not wild cherries, but young cherries, just exactly where the Experimental Farm is now at Agassiz. In the year 1889, I could eat cherries on the 6th of May, growing in the very grounds where

the Experimental Farm is now at Agassiz. So you see at once that the Pacific Coast up to Yale has a climate altogether different from anything that we can conceive of here. It is a long wet winter, and, if you choose again, it is a very short winter; no winter at all from our standpoint, but from the beginning of September to the beginning of May it rains more or less all the time. However, success is absolutely certain—there is not the slightest doubt about that. Professor Saunders speaks of trees 35 feet high after a growth of eleven years. All others grow equally well. There is not the slightest doubt about it. All that is necessary is to have them planted.

Dr. WM. SAUNDERS—I wish to say, with regard to drought, that it is much greater on the Island of Vancouver than it is on the mainland. As you strike the mainland, you find in Vancouver a much heavier rainfall during the year, and at Agassiz, where the experimental farm is, 70 miles from Vancouver, we have a rainfall averaging about 65 inches, nearly twice the rainfall in Ontario, but that rainfall is not very evenly distributed. Last year was the first year in the experience of the experimental farm when the month of August was without rain. It was an unusually dry season last year, and this has given largely an impression perhaps unfair to the climate. I know in Victoria it was exceedingly dry and dusty for five or six weeks, but Victoria is dryer than Agassiz. The whole coast for a hundred miles back towards the mountains is well adapted for growing hardwood trees, and I do not think there will be much difficulty in the way of raising young trees on account of the difficulties in the climate as you get away from the ocean.

Mr. THOS. SOUTHWORTH—To refer for a moment to the question under discussion some few minutes ago, I would beg leave to move, seconded by Mr. John Macoun, that a special committee be appointed, composed of Messrs. Geo. Johnson, R. H. Campbell, A. C. Campbell, Jackson Booth, E. G. Joly de Lotbinière, E. Stewart and the mover and seconder, to consider the question of an official organ to be published by the association, or a space in some regular publication as at present; in fact, to consider the whole question of propaganda, and to submit a report to the executive, and that the said executive be authorized to act upon the report at their discretion.

I should like to have this matter put to the meeting before we adjourn. The question is such an important one, and it will take this committee some little time to get the facts and figures on which to base an opinion on the question of an official organ to be published by ourselves that I am afraid they could not possibly report before we adjourn, and I think it may safely be left to the discretion of the executive to act on the report. Most of this proposed committee, with the exception of Mr. Joly, are residents in Ottawa, and as we have very little time to go into this matter to-day or to-morrow, I thought it wise to leave it in this way. I do not wish to shirk any responsibility in the matter, however.

The motion was agreed to.

Mr. GEO. JOHNSON—One question occurred to me while the experts were speaking about the forest trees of British Columbia. I should like to know from them, while the question is in my mind, whether the broad-leaved trees are not being driven out by the coniferous trees there, and whether it is not the history of that country that they had plenty of oak, much more than they have now, but that they are being gradually driven out; and, if that is so, whether it is worth while fighting against nature, and planting hardwood trees when nature says that we should not do so?

Professor MACOUN—Mr. Johnson knows that where he resided, down in Nova Scotia, the early forest growth was not hardwood, and it was not apples, and now, when they have cut away the forest and let in the sea air, the conifers are coming in again. The air from the Pacific ocean is coming in all the time and saturating the atmosphere, and the conifers love to dwell in a saturated atmosphere.

Dr. WM. SAUNDERS—I think we cannot altogether follow what might be called the teachings of nature in those matters, and just as the orchardist cuts down a piece of timber and plants apple trees, and succeeds in growing apples satisfactorily, so I think we can succeed in growing in the climate of British Columbia hardwood trees suitable to the climate, notwithstanding the fact that the country favours naturally, without man's intervention, the production of conifers. Practically the same conditions exist in the maritime provinces. If you let a piece of land there alone and leave it in pasture, if it is not closely taken care of you will find spruce coming up all over it, and in after years you will have a spruce growth where there formerly was a cultivated field. But nature has her ways of doing things, and man has his ways of doing things, but they can work together, and man can show his supremacy by dictating what shall grow in a certain place and nature will do the rest.

Professor MACOUN—That is so if the conditions are all right.

Mr. E. STEWART—Before separating, I may say that Dr. Fernow, the Director of the New York State College of Forestry, in connection with Cornell University, will deliver at the normal school hall this evening the lecture that has been announced an illustrated lecture, and one which I feel warranted in saying we can recommend everyone to attend. My object in rising more particularly was to give notice of a motion which will be taken up later on. It is with reference to a slight amendment of the constitution. Notice was given in the circulars sent out to the members, as was required by the constitution. I will merely read it and give notice that it will be brought up later on. The motion is:—

'That clause 4 of the constitution be amended by inserting the word "Patron" after the word "include," in the first line; and that clause 6 be amended by striking out the word "five" in the second line thereof, and inserting the word "three."'

The amendment of the first clause will simply add one more to the executive—that is the Patron. For certain reasons we thought it wise to have a Patron. The second will make the Executive Committee more workable. We sometimes met and found that five was more than could attend, and we were blocked in doing business. This is reducing the number to three. I need not say that it is the hope that the Executive Committee will, in the future, try to keep up the attendance as far as possible. I wish to give notice of that.

Mr. E. G. JOLY DE LOTBINÉERE—I desire to propose a vote of thanks to the chairman for the manner in which he has presided over this meeting.

The motion was agreed to.

The CHAIRMAN—I wish to return thanks for the expression of appreciation by the members present of anything which I have done. It has been a great pleasure to me to meet Mr. Joly here, and to hear his revered father's report read to us.

The convention then adjourned till 2.30 P.M.

Afternoon Session.

The association met at 2.30 P.M., Mr. W. Little, vice-president, in the chair.

The CHAIRMAN—There are three papers for this afternoon :—'Forestry in Ontario,' by Mr. Thomas Southworth, director of forestry for Ontario ; 'The Management of Wood Lots,' by Mr. W. N. Hutt, and the 'Forest Fires of 1901,' a paper prepared by instruction of the board of directors. These are all very important subjects, and will probably be thoroughly discussed. The discussions sometimes are really almost as important as the papers themselves, however carefully the papers may have been prepared. Other people may have had experience, or knowledge different from that presented by the writers in those papers. I must request gentlemen to keep their remarks within as small compass as possible, so that we may get through with all that we have undertaken to do to-day, and in order that all who have anything to say may have an opportunity to say it.

Mr. Thomas SOUTHWORTH, Director of Forestry for Ontario—Although I know it is exceedingly bad form, I may say that this paper is longer than I intended it to be. I made a mistake of a week in the date of this meeting, and have not had time to boil my paper into as little compass as I should like to have done. I hope, if you find it tedious, that you will bear with me. Although I am placed on the program as the Director of the Forests of Ontario, it is probably not necessary for me to say that what I have to submit this afternoon is absolutely unofficial and simply my own views. Any opinions advanced in this paper, aside from the statement of facts, are my own individually.

FORESTRY IN ONTARIO.

THOMAS SOUTHWORTH, *Director of Forestry for Ontario, Toronto, Ont.*

The secretary in assigning to me the subject of my paper certainly gave me one with sufficient latitude, but one so comprehensive and many sided as to preclude the possibility of more than a mere reference to some of its more important phases. It has often been said that each country presents a forestry problem or problems distinctly its own, and requiring a different solution from those of other countries. Not only is it true with us, but in Canada it may be said that the situation as regards forestry in each province is characterized by features dissimilar from those existing in the other provinces, necessitating more or less important difference in system and treatment. The same observation holds good to a large extent as regards the United States, for despite the variety of conditions prevailing there, in none of the states so far as I am aware, are the problems confronting the forester similar to those existing in Ontario. Quebec approaches us most closely in this respect, except that the difference in the dominant commercial trees of the two provinces causes necessarily some divergence in sylvicultural conditions and treatment.

Not merely do the forestry problems in Ontario differ in important respects from those of the other provinces, but there are essential differences presented by the various natural divisions of our own province due partly to geographical causes and partly to the progress of settlement accompanied by a change in the tenure of the land.

From a forestry standpoint, Ontario is composed of three main divisions differing materially from each other. The Southern division, to use the description of the Royal Forestry Commission of 1899, extends from near the confluence of the Ottawa and St. Lawrence rivers, the most easterly point of the province, along the St. Lawrence river to the Great Lakes, to Cabot's Head at the entrance of Georgian bay around the west and south shores of the bay to where the Laurentian and limestone series come in contact with each other on the east side of the bay, continuing eastward in an uneven line along the southern boundary of the Laurentian ridge to the Ottawa river.

This district comprises the fully settled part of the province. It was originally heavily timbered, the hardwoods predominating, but the forests also contained much whit e pine, and other conifers of large size and excellent quality. Owing to the superior character of the soil for agricultural purposes, and the unceasing demand for timber and wood of all kinds in large and readily accessible markets, deforestation has been carried to such an extent in many parts of this district as to adversely affect the climate and the distribution of moisture. Investigations recently undertaken by the bureau of forestry based on the municipal returns to the bureau of industries, giving the respective proportions of wooded and cleared land, show that eleven counties have less than ten per cent of their area in timber, while in sixteen other counties the area of woodland is less than 20 per cent. The continuance of the process of overclearance from year to year which is indicated by the figures shows that the question is becoming one of increasing urgency, while the fact that in this portion of the province the title to the land has passed from the Crown and become vested in individuals, places the matter beyond the direct control of the government and renders the problem entirely distinct from that of the other districts. As this highly important phase of the subject will be dealt with by Mr. Hutt, this brief reference to it will suffice.

DRAWING TIMBER.

Probably the most interesting division to the forester is the central division, extending from a short distance west of Ottawa city to Rat Portage, about one thousand miles in a straight line east and west. This district may be said to include the middle part of Ontario, and comprises the Laurentian country running from east to west, beginning at the north of the settled region and extending north beyond the height of land. It is practically all in thehands of the Crown, with the exception of scattered areas lying along the railways, some agricultural townships west of French river and along the Algoma branch of the Canadian Pacific Railway around Thunder bay and in the Rainy river

valley. It is in this district that the great permanent forest of the province is likely to be maintained.

The northern division comprises the section of country watered by streams flowing into James bay. Speaking broadly, it may be said to commence a short distance north of Lake Temiscamingue at the eastern boundary of the province, extending westward to the sources of the Albany river, bounded on the south by a line a short distance north of the height of land and on the north by Albany river and James bay. It is large in area, and the forestry problem presented requires a different treatment from that of either of the other two divisions. The conditions which have a special bearing on it may be briefly indicated.

Beginning at the head of Lake Temiscamingue, which lies between Ontario and Quebec, and bounded by the interprovincial boundary line on the east and the Montreal river on the south and west, is a triangular tract of rich agricultural land, comprising about 1,000,000 acres drained by the Blanche and Wahbi rivers.

It is a level clay country covered with a dense forest growth, mostly spruce, and is being rapidly settled. This tract is bounded by an outcropping of rocky country to the north about eight or ten miles in width; north of this outcrop of rock lies a tract of good land stretching across the province from east to west. So far as this has been explored it has been found to contain about sixteen million acres of land similar in character to the triangular section south of the height of land and covered with forest of a like character. This region, which is nearly equal in extent to the settled portion of the province before referred to, will ultimately be all settled. At present this country is not connected with the southern system of railroads, but this want is about to be supplied by the railroad proposed to be built by the provincial government. The road is projected at present only to the southern part of the agricultural belt, but it is expected that it will be extended as soon as the progress of settlement renders the work advisable. The roads heretofore chartered for the service of this region have had James bay as their objective point. It is to be hoped, however, that the Temiscamingue line will be built as a colonization enterprise, and only pushed as fast and as far as may be required for the close settlement of the land, in which case the road, after crossing the height of land and passing Lake Abittibi, will extend westward. Such a road, intersecting as it must the many streams flowing into James bay, would develop a much larger area of country than could be done by a road running north and south. I understand a charter has been applied for, for a road from some point west of Port Arthur through this agricultural belt and the northern part of Quebec to the seaboard. Such a road, if built before the country is settled up, would have a tendency to scatter squatters along the railroad and would be apt to cause immense loss by fire and the destruction of the large pulp wood forests of that region, estimated by the explorers sent out by the government in 1900 to contain 288,000,000 cords of spruce in the area covered by the explorations. If a road were to be constructed from the south and extend north and west in short stages, not in advance of settlement, this timber, or the greater part of it, could be safely harvested. While a through road from the east to west is probably inevitable, it is to be hoped that its construction may be deferred until the settlers have had an opportunity to reap the harvest which nature has already placed there.

North of this agricultural belt the country comprises a large amount of muskeg and swamp, and the timber is probably not of great commercial value. Geologists tell us that the character of the region is changing, that the surface of the country is gradually rising, encouraging the hope that at some time its forest wealth may be valuable. This, however, is a problem for the future which does not concern us at the present time.

I propose to revert to the central district, where our principal forestry problem exists, and where consequently a field will be afforded for the skill of the trained forester in order that its great timber resources may be so managed as to secure for the future of the province the maintenance of the public revenue, a steady and large supply of timber, and the incidental advantages that the presence of an extensive permanent forest implies.

Aside from sylviculture, and other differences between the United States and Ontario, there is another distinction to be borne in mind in comparing the progress made in forestry. Across the border legislation has only followed long continued and active education of public opinion. The reverse is the case in Ontario. In 1883, when the

position of Clerk of Forestry was created by the Ontario government, very little public interest was taken in the question, and in fact it is only within the last three or four years, that the value of the forestry work done by the government has begun to be appreciated by the general public. For some time after the creation of the office, the Clerk of Forestry devoted his attention to educating the public as to the danger of deforestation owing to the over-clearing of farms and lands in the possession of private individuals. In 1895 the office was transferred from the Department of Agriculture to that of Crown Lands, and was made a bureau under the direction of the Commissioner. Since that time, its work has been mainly directed towards the forestry problem in connection with the lands of the Crown rather than the reforestation of farm lands. In the interval much has been learned respecting the conditions of forest growth, the question of how best to manage our timbered areas so as to secure the best common results is now better understood, and changes in the system of disposing of our timber have been made in the direction of the ultimate adoption of a scientific system of forestry. In order to explain the progress and present condition of the movement for the more systematic working of the provincial forests, it may be well to give a summary of the development of the Crown timber regulations from the earlier days up to the present time.

The earliest concessions of the right to cut timber upon the Crown domain in Canada, given at a time when the demand for timber was comparatively slight and the profits of the business small, were granted to a few favoured individuals who paid nothing into the public treasury in return for the privilege. As the country grew and the business attained larger proportions, this condition of affairs naturally gave rise to much dissatisfaction, and many who were debarred from entering into competition with the privileged license-holders carried on operations without licenses and cut timber illegally upon the public lands. In order to remedy this abuse and to secure to the public treasury some portion of the value of the timber, a system of timber dues was adopted. Licenses were issued from year to year authorizing the cutting of timber within specified limits subject to the payment of the prescribed rates. From the outset of the system the principle was adopted of giving to the licensee merely the right to cut timber while retaining in the Crown the title to the land, contrary to the method followed in the United States, where large areas of timbered land have been disposed of to lumbermen in fee simple, often for a very inadequate consideration. The consequence is that the province of Ontario now occupies a far more favourable position as regards reforestation than do the adjoining states, as the lands which have been lumbered and burned over, and by reason of their comparative infertility have not been taken up by settlers, still remain in the possession of the Crown, and are available for reforestation on a large scale, whereas similar operations cannot be undertaken by our neighbours, except on the payment of large sums for the re-purchase of the land. This is, of course, aside from the national reserves.

Another step in the development of the system was the gradual introduction of the plan of disposing of timber licenses at public auction. In many cases more than one lumberman wished to secure the same timber limit. At first introduced tentatively where there were two or more applications for the same limit, it was finally adopted as the rule in all cases, securing to the public the full value of the privilege, while putting all desirous of engaging in the trade upon equal terms. Under this system the successful bidder agrees to pay in cash the amount of his bid, on the tacit understanding that the annual license will be renewed from year to year for such term as may be necessary or reasonable to allow the removal of the timber for which the 'bonus' is a part payment. This sum is based on the estimated stumpage value of the timber on the territory at the time of sale, less the fixed charge in the form of timber dues, payable when the timber is cut.

The main consideration which actuated the government in reserving the title to the land when disposing of the timber, was that they might be enabled to offer the inducement of free or cheap land to settlers. *The conditions of the timber licenses were drawn so as to leave the government free to withdraw from the territory included such land as might be required for settlement and allow homesteads to be located.* In a large portion of older Ontario the lumberman thus became the pioneer of settlement and civil-

ization, and in every locality where the character of the soil gave promise of successful agriculture, the removal of the more valuable timber was followed by the opening up and cultivation of the land.

As lumbering operations were pushed further to the north a region of a different character was reached, where the larger portion of the land being sterile, rocky or broken was unfit for settlement. With the exception of a few isolated districts there was nothing to attract population or allow the development of industries, the land once stripped of its timber being valueless. As a rule extensive and devastating forest fires followed the operations of the lumberman and completed the work of clearance. In a country destined to become the home of an agricultural community this was not a matter of vital consequence though frequently entailing heavy losses. But the rough, broken lands to the north of the settlements, were worthless except for the production of timber, and repeated bush fires, destroying not merely such mature trees as had been spared by the axe but the young undergrowth, the seedlings, and frequently the thin covering of forest soil which clothed the rocks, rendered large tracts of country valueless for the only purpose for which they could be utilized.

These conditions rendered necessary the adoption of an entirely different system of management of the Crown Lands from that pursued in dealing with the timbered land which it was intended to clear in order to make preparation for agricultural settlement. The chief difficulty in the way of maintaining as a permanent forest any territory in which lumbering was permitted was the liability to loss by fire, which furnished the lumberman with an incentive to rapid and thorough clearance and encouraged wasteful and reckless methods of cutting. To remedy this evil the fire ranging system was adopted in 1885, the subsequent extension and development of which has greatly lessened the danger from this source, and thus rendered practicable the management of the Crown forest on forestry principles. Fire being kept out the forest will perpetuate itself, and in the process of time, even the waste lands will be gradually reclothed with trees. Experience has abundantly demonstrated that excepting in cases in which repeated fires have destroyed old and young trees and the seeds in the ground—a pine forest when cut down will be succeeded by a young growth of the same species. They may at the outset be dominated by other varieties, the early growth of which is more rapid, but will eventually overtake and subdue them. This process of natural reproduction is now at work in very extensive tracts of burned and lumbered-over territory where all that is necessary to be done to secure a valuable crop is to protect the young timber from fire.

The government has adopted the policy of withdrawing from settlement and setting apart as Forest Reserves, extensive areas which have been found upon examination to be manifestly unsuited for cultivation. The first step in this direction was the creation in 1893 by a special Act of the Legislature, of the Algonquin National Park, which with subsequent additions comprises 1,109,383 acres. This park is not, strictly speaking, a forest reserve, as it was primarily designed for a game preserve and much of its area is under license, but as no settlement is allowed within its limits it largely partakes of that character. In the year 1897, the Director of Forestry drew attention to the subject, urging that both for economic and climatic reasons much of the territory that had been lumbered over and found unsuitable for tillage should be set aside as forest reserves.

In accordance with his recommendations, a Royal Commission was appointed the same year to inquire into and report on the subject of restoring and preserving the growth of white pine and other timber trees on lands not adapted for settlement. The Commissioners made a careful personal examination of large areas of cut and burned over land and their report strongly sustained the view of the director. Acting upon this report, the legislature in 1898 passed the Forest Reserves Act, empowering the administration to set apart tracts of such land in forest reserves as might from time to time be deemed advisable. The first action taken under this measure was the setting apart of 80,000 acres in the counties of Frontenac and Addington, which was followed by the withdrawal from settlement as a forest reserve of 45,000 acres in Sibley township on the north shore of Lake Superior. Both these tracts had been lumbered over and subsequently swept by fire, and in each case a new and promising growth of young pines had made its appearance, which if adequately protected from fire will replace the original forest.

In 1901, a more important and decisive step was taken by the setting apart of the pine-bearing region around Lake Temagami having an area of 1,400,000 acres. Unlike the previously constituted reserves, this territory is virgin forest and has never been under license. The quantity of pine timber now standing within its limits is estimated at from 3,000,000,000 to 5,000,000,000 feet board measure. It is altogether probable that had this region been dealt with in the ordinary way followed in cases where forest-covered land is presumed to be available for settlement, the presence of squatters and others following upon the opening up of the country would have resulted in extensive fires. The influx of large numbers of tourists and sportsmen who resort to Lake Temagami in increasing numbers during the summer months, rendered it all the more advisable to place it under strict regulations to anticipate this danger.

With the progress of settlement and industrial development in New Ontario, resulting in more accurate and detailed local information as to the character of the land, further action in the same direction will be taken from time to time, keeping in view the principle that tracts which can only be advantageously utilized in the production of timber ought to be permanently devoted to that purpose and operated on such a system, that they do not lose their distinctively forest character, which can only be recovered by slow degrees after a long interval of non-productiveness.

There is no doubt that in the adoption of the Forest Reserves Act, the Commissioner of Crown Lands had in view the creation of a large permanent forest, and in order to be sure that the territory would remain in that condition it was necessary to pass a special Act. Under the ordinary regulations the Lieutenant Governor in Council may withdraw land from sale and settlement, but another Order in Council may re-open it. Under the Forest Reserves Act, while an Order in Council may place territory within its operations, the land cannot afterwards be re-opened for sale or settlement by Order in Council, or by any means except a special Act of the Legislature. Under the ordinary regulations, if land upon which there was any considerable growth of timber were withdrawn from settlement, there would be a constant pressure upon the government to have it re-opened in order that so-called settlers might enjoy the privilege of removing the timber, without the inconvenience of paying timber dues.

Over much of the territory in the central division the forest reserve system may be extended as fast as money is provided to protect and care for the reserves.

In the case of the Temagami Reserve, the time had arrived when the timber must either be sold or protected until a more suitable time arrives to dispose of it to good advantage. Hence the creation of the reserve and the consequent protection of the timber. Extensive additions to its area can, and probably will be made on the west. A considerable extent of land might also be added on the east, comprising the country bordering on Lake Temiskaming, except for the reason that the territory in question is under license. This brings us to one of the problems confronting the administration, viz., the extension of the Forest Reserve system. I refer to the tenure of land under which the license holders operate their limits. Although timber licenses are only issued for one year, it has been the regular practice to renew them as a matter of course from year to year, so long as the conditions were complied with and the annual ground rent paid, excepting only in cases where the land was needed for agricultural settlement. Relying on the good faith of the government, licenses have been transferred from one holder to another, the same as bank stocks, without fear that the government might exercise its undoubted legal right of cancelling the license at the end of the year. No better evidence of confidence in the continuance of this course could be adduced than the transfer of a license at Ottawa a few days ago covering 129 square miles of territory, which had been lumbered over at intervals during the last 40 years. It was sold, I believe, for no less a sum than $655,000 by the then holder to Mr. J. R. Booth, of Ottawa. Incidentally this case also affords evidence that the cutting off of the original crop of pine on so-called virgin territory does not end the chapter, in Ontario at least. In this connection, it might be urged, 'Why not take in these licensed areas as an addition to the forest reserves?' I am of opinion that this would be unfair to the province in that it would give the present license holders practically a perpetual tenure of their limits without securing to the public a fair proportion of the value of the stumpage. Take the case of the limit before referred to. The right to cut timber on this territory

Scenes in the Temagami Reserve. (This is an almost pure Pine Forest.)
(Photo. by Archd. M. Campbell.)

was sold many years ago, the original limit-holder paying 50 cents per mile for the exclusive right to cut, the timber itself being subject to dues of $1 per thousand feet when cut. After the limit had been operated for 40 years, this exclusive right to cut, changed hands at the rate of over $5,000 per square mile. It is safe to assume that the original commercial timber has all been removed, and that the holder is now cutting timber matured since the original issue of the license. The value of the stumpage is probably at least $6 per thousand feet, of which the public treasury only receives $1. From this it is easily seen that if the government were to include lands under license in the Forest Reserves system, it would remove any doubts as to their intention to continue the present tenure perpetually, unless it were done with some clear and distinct understanding as regards the future position of these holdings. On the other hand, the present condition of the tenure of licenses is an uncertain one, and it is probable that some readjustment may eventually be made, satisfactory to the limit owners and to the province by which the provincial revenue may be increased, and the present uncertainty of tenure in limits in non-agricultural lands removed.

Whether or not these areas come under the operation of the Forest Reserve Act, the non-agricultural country included in them will remain in forest to be operated, if not for the financial benefit of the province, at least for the profit of the holders and with good results to our industrial life and incidental advantage to the climate and water supply. It is fair to say that the difficulty arising from the vested rights or claims of limit holders is not likely to obtain in regard to the territory included in future timber sales. While the auction system has been retained by the government, a definite term is fixed beyond which licenses will not be renewed. In the sales of the past two years the term has been fixed at ten years, and although licenses are thus limited, I cannot see that the selling value has been affected to any great extent.

One of the important questions immediately confronting the government in its forward forestry policy is the exploitation of the timber wealth in the Temagami Reserve. I have stated that there exists a large quantity of pine timber in this reserve, but only in part of the territory is the pine timber fully matured. A great deal of the northern part of the reserve contains timber only partially grown. How best to harvest the crop ready to cut is the problem immediately pressing. In the other reserves so far created the timber is all young, as they have been for the most part lumbered over and in some cases burned over, consequently they do not require any further consideration than one of fire protection for the present. While the timber in the southern part of the Temagami Reserve is fully matured it is not dying so far as I have been able to see, and therefore our interests are not suffering from delay as in fact there is very little of it that is not growing slowly yet. As we have felt that these forests are now reasonably safe from fire, there is probably no immediate necessity for harvesting this timber until we are fully prepared to do so. At the same time some plan for operating the reserve with less wasteful and extravagant methods than have been followed elsewhere needs to be adopted in the very near future.

Two plans have been suggested. One is to sell the logs after having been cut by the department, and the other is to sell the timber on the stump. I of course assume that under this latter plan the timber will not be sold in the same way as has been the case in the territory now under license, that is to say, paying a lump sum in advance as a bonus with fixed stumpage charge, but to be disposed of by public competition at the highest price possible per M. on the stump, the whole of the price to be paid to the government as the timber is cut.

As to these two plans I am afraid that just at present we are scarcely far enough advanced or in a position to put in our own men to remove this timber, and while if we had a scientifically trained staff of men it might be done effectively, such a policy would encounter strong opposition owing to the popular impression that no government can conduct industrial enterprises as successfully as can be done by private individuals. I apprehend it will not be many years before there will be a change of sentiment in this respect, but at present it has considerable weight and for that reason I doubt whether it would be advisable to harvest this timber in this way, but that is merely my individual opinion.

The other plan proposed seems to me to possess many advantages. The lumberman paying for the timber would have to do so on the understanding that he would be allowed to take from a certain territory so many million feet of timber within a specified time, paying therefor when cut, the price agreed upon at the public sale and the timber to be cut subject to the supervision and control of the officers of the department. One objection to the present system under which the limits are bought at auction with a cash bonus, is in the fact that although the lumbermen may not have taken into account in estimating the value of the limits, the small but growing timber on the territory, when he comes to cut the large timber if there happens to be a quantity of young stuff worth the amount of the small fixed stumpage charge, there is a strong temptation to remove it, although it could more profitably be left to grow. Under the plan to which I have referred, the tendency would be in the other direction. If this timber were bought for $6 or $7 per M. on the stump the purchaser would not be over anxious to take out stuff that was only worth half that figure, in fact the difficulty would rather be in the forest officers insisting on the removal of ill shapen and small timber that ought to be removed.

HEWING AND SCORING.

Whatever plan may be adopted for disposing of this timber it is evident to thoughtful men, that the time has arrived when we need more highly trained men in our forests than are now available in any considerable number. So long as lumbering was considered an ephemeral business and not a permanent industry, the need of scientifically trained men was not so apparent as now, and I believe the need will not only be appreciated generally in a short time, but will be supplied.

To sum up briefly what has been done in the direction of establishing a practical system of forestry in Ontario, it is sufficient to say that we have established a fairly effective system of fire protection. The fee simple of our forest lands remains in the Crown. We have definitely inaugurated a system of forest reserves intended to form part of an extensive and permanent Crown forest from which the province may derive a large annual revenue, and from which the individual people of the province may obtain wealth and employment. To the scientific treatment of this Crown forest we are only gradually approaching, but we are steadily ascertaining the problems to be solved and there is no doubt that the solutions will be found.

And now let me briefly refer to this permanent Crown forest and its probable extent. A reference to the map of the province will show that this forest will extend across the province from east to west with large agricultural communities settled upon very rich land both north and south of it, and forming the watershed of all the principal stream, flowing south into the great lakes and north into Hudson's bay. In this immense territory there will be some communities of agricultural settlers, small in extent and probably not more than sufficient to supply the needs of the operators in the forest, and there will be some small areas, comparatively speaking, of lands that will be held by private individuals for mining purposes as well as for railway stations and perhaps various other industrial establishments dependent on mining and lumbering. In this term—permanent forest, I include all the land still held by the Crown whether under license to lumbermen or set apart under the Forest Reserves Act. Although we have at present only 2,634,000 acres in Forest Reserves, I do not think it unreasonable to expect that ultimately the Crown Forest of Ontario will comprise fully 25,000,000 acres, a state forest larger than is possessed by any other country I know of. What a forest of this size, owned by the people as a whole, will mean to the revenue of the province when placed under scientific control and systematically worked is difficult to conjecture. Already with our wasteful methods and when only a small part of this territory is being operated, the province receives in revenue about $1,000,000 per year, and that this sum could be enormously increased under the conditions referred to, no one I think will entertain any serious doubt. The composition of this vast forest is such as to make it the most valuable in the whole world. While it contains a large quantity of spruce and birch, the paper and furniture woods par excellence, it is the natural habitat of the most valuable tree of them all—the lordly white pine, the tree that has already been so largely the cause of the unique position occupied by the province of Ontario in being a country without a debt and where the people are not subject to any direct tax for state purposes. That Ontario owes a great deal to the white pine scarcely any one in Ottawa at least will venture to dispute, and with all due deference to Senator Snowball, of New Brunswick, and his reverence for the spruce tree, I will crave the indulgence of the convention by quoting the following from 'Wood Notes' by Ralph Waldo Emerson—

What prizes the town and the tower?
Only what the pine tree yields;
Sinew that subdued the fields,
The wild-eyed boy, who in the woods
Chants his hymn to hills and floods
Whom the city's poisoning spleen
Made not pale nor fat nor lean.
Whose iron arms, and iron mould
Know not fear, fatigue or cold—
I give my rafters to his boat,
My billets to his boiler's throat,
And I will swim the ancient sea
To float my child to victory,
And grant to dwellers with the pine
Dominion o'er the palm and vine.
Who leaves the pine tree leaves his friend,
Unnerves his strength, invites his end.

The CHAIRMAN—We have had a very excellent paper from Mr. Southworth, and it is a paper that deserves very serious thought. On a number of the ideas thrown out by Mr. Southworth there ought to be some discussion. He brings forward the very important question of the tenure of licenses. The mere fact of a gentleman in this city paying $650,000 for a timber license, the tenure of which depends on the good faith of the government, shows the importance of the subject. There is not only the uncertainty of a tenure of this kind, but the limit is liable to be destroyed by fire at any time, showing that there should be some system—not haphazard, but something to protect timber from fire when it is so valuable now, and becoming more valuable every day. The purchaser of the limit does not expect to cut the timber to-day. He has timber, I understand, on other limits enough to last him for a number of years, and that is one of the

important things for the government of Ontario to consider—to protect the timber that remains by every means in their power, so, when gentlemen pay large sums for limits as to give them some reasonable assurance that they are going to have that timber. I am delighted to know that that is the condition of things to-day, that they are discussing the protection of timber. Mr. Booth will bear me out in saying that the policy used to be to get rid of the timber as fast as possible. We would get out licenses and then receive letters from the government notifying us that we must cut the timber. The dues began at 50 cents, then were raised to a dollar, two dollars, three dollars, up to sixteen dollars, the department always forcing us to cut the timber. Having said that we must confine ourselves to a few words in discussion, I must not set a bad example by saying too much.

Mr. WRIGHT—What precautions are the government actually taking to protect the timber?

Mr. SOUTHWORTH—I did not think it necessary to go into that matter in my paper. For the information of Mr. Wright and others who may not be aware of it, I might briefly mention that up to 1900 it was a purely optional system. The government made an offer to the limit holders that if they chose to pay half the expense of keeping rangers to patrol their limits during the dangerous months of the year, the government would pay the other half. The wages of the rangers were two dollars per day, of which the government paid half and the lumbermen paid half. Very few limit holders took advantage of it at the beginning, but now every limit holder does, and the government employs an increasing number of rangers for the protection of territory not under license. As showing the effectiveness of that, I may mention that in the Temagami Reserve last year eight distinct fires were started, four of which would have been very destructive. The presence of rangers on the spot checked all of them and there was no loss whatever. That is the only measure adopted for the protection of forests from fire, and I think Mr. Booth will bear testimony to the success of the system so far adopted.

Mr. WRIGHT—So far as the timber limits are concerned, that works admirably, but sometimes it does not work quite as well where men are working for the government. I am pleased to know that the government are taking every precaution they can, because the timber of that section is almost invaluable.

Mr. SOUTHWORTH—I should like to have an expression of opinion from some members of the association on the question of harvesting timber on the Temagami reserve.

The CHAIRMAN—Does any member of the association know much about the section?

Mr. SOUTHWORTH—It is not a question of knowledge of the locality.

The CHAIRMAN—I should like Mr. Booth to say a few words on the subject of this paper. At our first meeting here Mr. Booth made some excellent remarks on the subject of the protection of the forest from fire, and also the tenure of the land. At that time we had no publication to keep these things together, and his experience will be very valuable.

Mr. J. R. BOOTH—Mr. President, I do not suppose I could add anything to what has been already said here about the preservation of our forests. My object in coming here at this time was in hopes that I might hear from the government some plan where-

by they could suggest the preservation of the forests and the carrying on of agricultural operations in the same district. If there is any scheme by which those two interests can be continued with safety, I think that is about the solution of the whole subject. I have never been able yet to see how those two interests can be preserved in the same district. The government are generous in paying a certain sum for the protection of the forests from fire in the dry season, but I presume a great many in this room have a very good idea of how helpless a gang of men are to handle fire in a forest. It is an old saying that an ounce of prevention is worth a pound of cure, and I think that is the right way to preserve the forests. It rests with the government to say how far they should allow settlers to go into a country that is not fit for agricultural purposes, where there is only a mere patch of good land here and there. To establish a settler in such a district is to endanger thousands upon thousands of acres of timber around him. That has been going on in this Ottawa district all the time I have been here, forty years, and it is still continued, and I do not see but we are having those fires now almost as generally as a number of years ago. Even last summer we had the most destructive fire that we have had for a long time in the Nipissing, the Temiscamingue, and the Kippewa Districts. The woods was full of men, yet they had no power over it. We all know how that fire originated—through settlers. There was more timber burnt in that fire than all the settlers that will be in that country for the next forty years will pay the country for. If the Government continue the practice of putting settlers into such a country, no matter if there are small patches or even large quantities of arable lands, they should, in my opinion, decide which is the more valuable to the country to preserve the forests or to make a small settlement in a country valuable mainly for its forests.

Mr. WRIGHT—I do not wish to be known for my much speaking, but I can assure you this is a question which has come up very frequently in this committee room when railway men have been looking for charters. That is the reason why so many have fought against granting charters for lines going into those wooded sections, because as fast as the railway extends, land not valuable for agricultural purposes is denuded of its forests, and we lose more by destruction of timber than we gain by settlement. If any one can show us a way out of that difficulty it is worth hearing.

Mr. E. G. JOLY—I have not studied this question as I might have done, but in the province of Quebec—and I presume it is very much the case in the province of Ontario —most of our serious fires originate, as Mr. Booth and others have said, from the settlers in sections of land that have been taken out of limits and opened for colonization. There is no doubt it is difficult to draw the line where colonization should cease. If there is good land, settlers naturally will locate upon it, and with the influence they usually have behind them, will manage to get it from the license holders within the limits, but if the government allow that, there should be a rational method of granting that land to colonists. Let us suppose that they have a tract of 40,000 or 50,000 acres for colonization. When that is surveyed and a colonization road put through it, the colonists should not be allowed to choose lots where they please—the lots should be taken on the range along the colonization road first. The land on that range should be completely taken up before the colonists are allowed to go into the second range, and no fires should be allowed to be lit in a dry season behind the settled range. That first range should be cleared before the second is opened up. In that way people would be properly grouped together, and if fire gets a little headway, the settlers will be in a position to

assist each other to put it out, instead of being scattered over a large tract of land, and being unable to co-operate to make headway against fire. I humbly submit this opinion, which I hope will strike gentlemen here as having common sense in it.

Mr. HIRAM ROBINSON—It would seem to me that the first thing to be considered by all governments is whether the land is really fit for settlement or not. If it is unfit for settlement, then it should certainly be reserved. It is well known to most people along the Ottawa that great regions of country are not fit for settlement, and notwithstanding that, lots have been sold to settlers who have occupied them for a few years until the timber was removed, and the locality left a barren desert. I have in my mind's eye now a place on the river Gatineau, where settlers went in about twenty-five years ago, and fires started there by settlers burnt some 300,000,000 or 400,000,000 feet of white pine. The pine grew so thick that it would be almost impossible to get through it in the ordinary manner. In those days settlers could acquire a location ticket, as they called it, make a few acres of clearance, put up a little shanty and then start to cut the timber. They got the absolute right to the timber after a time. This was changed, however. I can well remember when scores of so-called settlers went in, not for the land, because there was no land fit for settlement there, but just for the timber, and through that the province of Quebec lost that vast quantity of timber. You can go into that locality now and not find one settler in twenty miles—the land is not fit for settlement. A great difficulty with the government—I am not so sure that it obtains so much in Ontario as it does in Quebec—is, that there are so many members representing agricultural districts, who, perhaps not with a full knowledge of all these things, press on the government to open up certain districts for settlement. Now, the government is well disposed to reserve these districts, but there is a great pressure brought upon them to open up the lands whether they are fit for settlement or not. I understand, and I think it is the case, that the Quebec government are seriously thinking of appointing a small commission of independent men to examine certain sections of the country which they are asked to open up, and see if the land is really fit for settlement, and if found unfit for settlement, of course the commission will recommend the government to reserve the land and not allow settlers upon it to burn up the timber. Last year, as Mr. Booth has stated, the fire in the Temiscamingue district was very destructive. I do not know how many million feet of lumber that fire destroyed, but it is estimated all the way from 200,000,000 millions upward. It is beyond all doubt that that fire was started by settlers. On the Ontario side I know the fire started near limits on the Petawawa. Our firm, the Hawkesbury Lumber Company, fought that fire, night and day, for a month. It did not get into our limits; we fought it outside of our limits. I do not think it was started by settlers; I think it was started by pot-hunters, or fishermen. These are the conditions which obtain, and the government, I think, are most anxious to preserve the timber; but we must not forget that there is pressure on one side or the other to open up new territory, and we must sustain the hands of the government as far as possible in trying to preserve these forest districts which are so valuable, not only to the province, but to the whole Dominion of Canada.

Mr. E. STEWART—I desire to say one or two words. I will not detain you at all, because I think it is our duty to listen to the advice of those who come here, and the Forestry Association is formed for the purpose of getting the advice of people outside and throughout the country, in order that those in charge of the forestry office may profit by

their advice. I think Mr. Booth struck the nail on the head when he said that certain areas should be set aside for timber purposes. You will observe that in our constitution there is one clause devoted to that very purpose. One of the aims of the association is :—

'To consider and recommend the exploration, as far as practicable, of our public domain and its division into agricultural, timber and mineral lands, with a view to direct immigration and the pursuits of our pioneers into channels best suited to advance their interests and the public welfare. With this accomplished, a portion of the unappropriated lands of the country could be permanently reserved for the growth of timber.'

Without having exploration it is impossible for the government to say what districts should be set aside for agricultural purposes, and what should be set aside for timber. There is no question in the world that within a half a day's journey from this city you can find townships up the Ottawa and through the northern country that never should have been opened for settlement, that were better adapted for the growth of timber than for anything else, and should have been reserved for that purpose. But without having exploration of the country in advance, it is difficult to say what those districts are ; and the same obtains everywhere. In British Columbia, in the belt of forest north of the prairies, the question is continually arising. I am recommending the reservation of our timber lands very frequently, but the question at once presents itself as to what should be included in the reserve ; and I say that the most important matter that can be undertaken by the government to-day is the exploration of the country, in order to determine what those lands are. There is another point to which I wish to refer ; it is not alone for the production of the timber that we wish to reserve those forests, but in many cases it is absolutely necessary to preserve the water supply. Take the river Ottawa itself ; what would the Chaudiere falls be worth if the upper Ottawa were denuded of timber ? We would have a flood of water in the spring, and a dearth of water later on, and I think it rests with the people of Ottawa and this district to impress upon the government and the legislature of Quebec to set aside, on the upper Ottawa, reserves similar to those which are set apart at Temagami and Algonquin Park for the preservation of the water supply, if nothing else. There is one other point I wish to refer to. The work of the rangers has been spoken of. We have tried different methods in the North-west of building fire guards, and there are other ways of protecting the timber ; but I am thoroughly convinced that the money of the country can be better used in the employment of fire rangers for this purpose than in any other way ; and as is said in the paper, you never can tell what those fire rangers will accomplish. I have one ranger up in the North-west, in the Riding Mountain, who put it very strongly in this way ; he said that the best time to stop a fire was before it started. He was an Irishman and put it in that way, but there is a good deal of truth in it. These fire rangers will do more by warning parties going into the country as to the careless use of fire, and to impress upon them that they will be prosecuted—and the burden of proof rests with them in most cases—that they will be prosecuted if they do not take care in their use of fire. I have nothing further to say. The paper is an exceedingly valuable one, not only valuable for the information it gives, but in outlining the policy that may be adopted. It is worthy of consideration, and will form a valuable addition to the report that may be issued of this meeting.

Mr. THOMAS SOUTHWORTH—In reference to the inquiry of Mr. Booth, I am afraid I failed signally to make myself at all clear. I tried to emphasize the fact that the

very policy that Mr. Booth urges the government to adopt is just exactly the policy inaugurated in the passage of the Forest Reserves Act. Until we had an Act of Parliament giving the government power to set aside reserves, there was no use setting them aside, because it was just as easy, and was likely to be done owing to the pressure that Mr. Robinson speaks of, to put them back into lands open for settlement as it was to reserve them from settlement. Under the Forest Reserves Act that cannot be done. We are only putting under forest reserves land that is not under license; but I am in hopes that provision will be made to extend them to include lands under license when they are found, on examination, not to be suited for agricultural purposes. On one of Mr. Booth's own limits this year there was a strong pressure brought to bear by people wanting to settle in it. I happen to know personally that that township was inspected and found unfit for settlement, and the people were notified that it would not be open for settlement. That policy is difficult to carry out in respect of some lands. We have no difficulty with Temagami. The government have not the power to allow a settler to go in there under the Act, if they wished to do so. Nothing but an Act of Parliament can do that. We are progressing, not as fast as Mr. Booth would like, but we are really progressing in the matter.

Professor MACOUN—In connection with forest fires, I should like to say a word. Mr. Southworth says there were eight fires in the Temagami district during the past season, and at least four of them were started by settlers.

Mr, SOUTHWORTH—No.

Professor MACOUN—You said you knew the origin of four of them?

Mr. SOUTHWORTH—Yes.

Professor MACOUN—I should like to know from Mr. Southworth what the government has done to these men that originated the fires. You will see the point I want to make. We have a license law in the city of Ottawa, and any one selling liquor during prohibited hours is liable to be punished. But the liability only is there: the punishment does not come. We may talk here till we are sick, and we may talk here till we are balder, many of us, than we are: but unless the laws that the government has made are enforced by the government officials, there will be fires. I have been on a railroad train when the engine started more than one fire, and any man could see where the fire started along the line of the road. Was there a word said? No. We all know it. I will speak of these fires later on when we come to the report. The fire up in the Kippewa country was traced right home, as you will see by the report that will come up later. Has the Quebec government done anything in the matter? I am speaking ahead, and I tell you 'No.'. But it is likely the people will be warned; 'if you do that again you will catch it:' but they say 'We did not catch it last time, and we will risk it this time.' I tell you, gentlemen, it is the want of the enforcement of the laws that we have that is the cause of the trouble. Any man who looks back at Ontario for the last forty years knows that the settlers forty years ago were more careful about fire than many of them are to-day. Some gentleman, perhaps Mr. Booth, said that it was the act of the pot-hunters that started the fires. Send the pot-hunter to jail for five years. They are incendiary fires, and these men are incendiaries. Send them to jail or to the penitentiary for five years, and let it go abroad that one man anywhere in the country was sent to jail for five years for starting forest fires, and you will stop ninety per cent of the

fires by that means. But do you think it will be done? No, gentlemen; we will talk and we will write, and the government will make laws and pay men to enforce them, and the men who are required to enforce the law say that the government do not expect them to do it, and therefore it is not done.

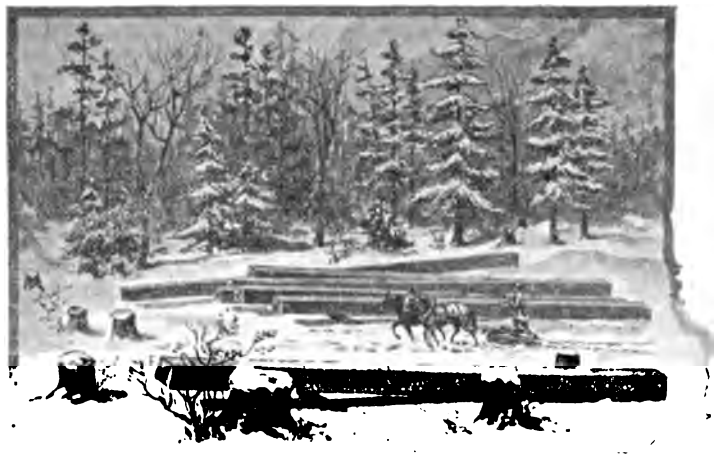
Mr. SOUTHWORTH—I am afraid I cannot give you any horrible story of incarceration of the men who set these fires. Two of them, I think, were set by lightning, were they not, Mr. Campbell?

Mr. A. M. CAMPBELL—I said three or four of them.

Mr. SOUTHWORTH—I am speaking of the four serious fires.

Mr. A. M. CAMPBELL—Yes.

Mr. SOUTHWORTH—The other two were set by two of the natives, whose tribe of Indians are, I think, the most careful Indians in Canada: and our men investigated it. These men had stopped on the trail to cook lunch, and the fire started fully four feet away from the place where they set out their fire. They put out their own fire with water. The only way the ranger explains it is that the pouring of the water on the stones which had become heated, caused them to explode, as will sometimes happen, and apparently threw a spark some distance from the fire, which, on account of the extremely inflammable nature of the country in a dry time, started another fire. The boys had attempted to put out the fire, and thought they had done so, and they were accustomed to the bush. That fire started fully three or four feet away from where these boys had lit the fire to cook their lunch. That accounts for three of them. The other one, I am afraid, was the result of a bonfire set by a guide, a native of the district who was conducting a party of tourists through the country. The bonfire spread, but the tourists got out before we could get there. It was not a very serious fire, and one of the natives extinguished it. But it is a very difficult matter to convict men. I know that in Thunder bay district a man admitted that he had set fire for prospecting purposes, and when the timber agent threatened to have him arrested he said that he could not prove it, and the timber agent said he would prove it by himself, and the man said that he would swear he did not do it, and that he could not get other evidence. The timber agent was satisfied the man would swear as he said he would. I should like to see an example made of such men, but it is a very difficult thing to do.



SKIDDING.

The CHAIRMAN—We will have a paper on forest fires later on.

Mr. ROBERT GORMAN—In this paper, reference is made to the quantity of spruce on those sixteen million acres of land, and it is spoken of as being 288,000,000 cords. You did not give any estimate at all of the quantity of timber on that.

Mr. SOUTHWORTH—There is no pine timber.

Mr. GORMAN—None?

Mr. SOUTHWORTH—Comparatively none, scarcely enough for building purposes. It is beyond the pine limit, and is essentially a spruce country. There is no pine in that region. There is pine in limited quantities south of it, but it does not even extend to the northern limit of Temiscamingue township, as far as I know, and there is no pine in that belt itself nor for some distance south of it. The pine belt can be seen on this map. The territory on this map, including this reserve, is what I take to be permanent forest. Taking out this district, there are about four million acres, and probably a smaller quantity around Thunder bay more broken than the other two, and there is some agricultural land along the Algoma branch of the Canadian Pacific Railway, along the Georgian bay, and there is no pine timber in that at all, as far as I know.

Mr. ROBERT GORMAN—I read the report of the surveyors, and they report a large amount of pine in the section that they explored, so that they would be south of that.

Mr. SOUTHWORTH—Yes, they include the Temagami Reserve.

Mr. ROBERT GORMAN—One remark made by Mr. Southworth was not quite correct according to my idea. Mr. Robinson gave an assent to it that I think on consideration he probably would withdraw, and that was that, that in that territory recently purchased by Mr. Booth, all the original timber had been removed; I think that is a mistake. That land has been in the hands of a very conservative man who has operated it very conservatively and only cut a limited quantity each year, and he exclusively confined his operations to the manufacture of square timber, square and waney pine for the Quebec market, with the exception of one year when he built a mill and cut logs for that mill one year. He did not manufacture logs for sale, consequently the limit has not been operated upon for logs. So that Mr. Southworth was not quite correct. Putting a liberal estimate on the amount of timber cut on that reserve, it would only amount to about 72,000,000 feet. We know that it is only the very choicest and best pine that is cut for board timber or square timber, and the coarser timber is not cut the same as it is cut for logs, and one year's cutting for logs would take off more than five years' cutting of square timber.

The CHAIRMAN—Is there not some portion of the timber that has not been cut at all?

Mr. ROBERT GORMAN—Yes, a portion of it has not been cut at all.

Mr. SOUTHWORTH—I qualified my statement by saying that I had not any personal information.

Mr. ROBINSON—A portion of it has been cut for square timber.

Mr. ROBERT GORMAN—And a great deal of the original timber is there still.

MANAGEMENT OF THE FARMER'S WOODLOT.

BY WM. N. HUTT, SOUTHEND, ONT.

I think it may safely be said that the farmer's woodlot or bush receives less care and attention than any other part of the farm. Indeed the woodlot is hardly considered as part of the farm at all. The attention it generally receives is the destructive blows of the axe in winter and the no less harmful browsing of stock in summer. Under this treatment the wood is constantly decreasing in quantity and value, and the land lies as an unprofitable, stumpy waste, which is neither wood nor pasture; or is turned into cultivation for which, being generally poor land, it is little fitted. Doubtless this unproductiveness of the woodlot is due to the fact that farmers generally do not consider the bush capable of any systematic management, or regular cropping, or at all capable of repaying any labour expended upon it.

As farmers, we are too apt to consider bush land as something to be cleared up and not to be perpetuated, or as a gift of nature for our own special benefit and one that cannot be renewed. The time it takes for a seedling tree to become of marketable value is not so long as is usually supposed. Of course if we had to begin on a bare field to raise timber, it would be a somewhat different matter. But in the ordinary woodlot we find trees of 10, 20, 30, 50 or even of 70 or 100 years' growth.

Nature if left to herself will gradually change a scanty coppice into a forest of value, but at best her methods in forestry are slow and somewhat irregular. However, by careful thought and practical management, nature may be so assisted that the woodlot may be made to supply not only all present needs for fuel, but to give regular crops of merchantable timber, and to be year by year increasing in permanent value. Growing forest trees are very susceptible of management; the crooked may be made straight or the straight crooked, the spreading may be made close or the close to spread, just as we wish. While the prices of wheat and other farm products have been decreasing and are likely to decrease still more, the price of lumber owing to increasing scarcity has been continually going up. We are painfully reminded of this fact if we wish to put up any building however small. Any woods under careful handling may be made to produce regular if not annual crops without the expenditure of a single dollar for replanting.

With these few facts in mind it is our intention to outline the practical management of a woodlot, such as we might find it anywhere throughout the country, with a view to attaining its greatest present usefulness and permanent value.

Taking a sort of inventory of an ordinary woodlot we would find it somewhat as follows:—

1. More or less (generally less) of mature trees.
2. Trees past maturity.
3. Premature trees.
4. Healthy growing trees.
5. Coppice and seedlings.
6. Stump land.
7. Waste, i.e., with no wood on it whatever.

1. Mature trees are those which by reason of age have arrived at their greatest size and most valuable quality of timber, and are therefore ready for cutting.

2. Trees past maturity are those which have not been cut on becoming mature, have become dead at the top, and the rain getting down into them has destroyed the quality of the wood. Finally these trees become hollow, and though they may be annually laying on new wood underneath the bark, yet owing to the action of insects and wood-destroying fungi, the rate of decay gradually exceeds the rate of growth, till some day the wind brings them down as useless old shells.

3. Premature trees are those which by reason of some accident of wind or storm have become broken and decayed, and being thereby checked in growth they never make valuable timber. A dead top, and stunted growth are generally indicative of the premature condition.

4. Healthy growing trees are those which are to take the places of the mature trees as the latter are removed.

5. Coppice consists of the shoots that spring up from the stumps of trees that have been cut. See figure 1. The seedlings are the tiny trees which have come up from the seed of the mature trees.

Methods of Replanting.—The first thing to be done with the woodlot is to get it all under crop. There should not be a spare rod of it that is not producing trees. Land in a wheat field not producing wheat is waste land; land in a bush that is not raising trees is also waste land.

Reproduction of Trees.—All trees reproduce themselves naturally from seed, some also by coppice, and under natural conditions the mature trees would seed the ground around them. In this way spaces would gradually become filled up with growing timber. If, however, stock are allowed to graze in the woodlot, the seedlings and undergrowth are prevented from coming up, and all natural provision for the perpetuation of the forest is cut off. The rough pasture on the few open spaces in a woodlot is of very little value, while the harm done to the trees is very great.

Keep out Stock.—One woodlot which I have had under observation gave a very clear proof of this last year. In the spring as growth started, around the mature trees could be seen coming up a fine crop of young seedlings. In a few weeks cattle and sheep were turned into the woods. In summer the pasture became very bare and the stock browsed off the leaves of the little seedlings. Owing to excessive drought in the early fall, the pasture was not renewed, and the stock ate off not only the leaves but also the green shoots of the trees and shrubs, as high up as they could reach. In the fall when the stock were taken out of the woods, there was not a seedling to be seen, nor a leaf, nor green shoot on the older trees within five or six feet of the ground. Under this treatment, year after year, this lot has produced no new trees, and the old ones being removed it is becoming an unprofitable, stumpy waste. But by far the greater injury from stock results indirectly from the trampling of the soil and the consequent destruction of the natural mulch about the trees. On the vegetable mould of the forest floor depends largely the health and vigour of the trees. This mould, which is composed chiefly of decaying leaves and twigs, is of a very porous nature, and forms a natural reservoir for water. Under the shade of the tree tops the moisture of the vegetable mould is given up slowly throughout the season, and the air about the trees is kept in that humid condition so favourable for plant growth The downward movement of water through the forest mould is also slow, and as the water table gradually lowers, the roots of the trees push downward through the softened subsoil. For this reason forest trees under natural conditions are deep rooted and are seldom blown down by high winds, Moreover, by virtue of the slow movement of water in the forest mould the springs of the woodland have a continuous, even flow throughout the year.

One of the most noticeable features of pastured woodlots is the absence of the natural forest mould. The sharp feet of stock cut up the soft turf, and pack it, so that its water holding capacity is practically destroyed. For this reason creeks become in spring rushing torrents, roaring down hillsides and tearing away the fertile soil, and are dried-up, rocky gullies almost before summer comes. Rain falling upon pastured woods finds in the soil no natural reservoir, but passes quickly through to the creeks to swell them for a few hours, and is lost to the trees. When summer comes the soil of pastured woods is hard and cracked like a bare fallow. The rain which fell upon it passed through it so quickly that the roots of the trees have been unable to follow down after the too rapidly receding water table. Deep root growth under such conditions is checked, and the trees are very frequently blown over by strong winds. It is not an uncommon thing on closely pastured woodlots to see sturdy oaks, maples, or even the tough-rooted elm, overturned by the wind.

Besides being a reservoir for moisture the forest mould is a natural seed bed and nursery for nuts and seeds which fall upon it from the trees above. It must be known that seedlings of forest trees are among the most delicate of all plants, and require during their early years almost ideal conditions of vegetation. In the deep, rich mould,

under the protecting shade of the parent trees, the little seedling finds this ideal condition of growth in which to start. When a break occurs in the leafy canopy overhead, the little tree stretches up quickly to fill up the gap. The parched and trampled soil of a pastured woodlot offers only a lingering death to the tender seedling, and nature's means of perpetuating the forest is cut off. For this reason pasture ranges are always characterized by a decreasing number of trees, and the roots of these lacking their natural protection the trees have always a stunted, scrubby appearance. On constantly pastured woods it is not an uncommon thing in a dry summer to see large trees wither up and die. Doubtless these trees had been resisting adverse conditions for years—the wonder was that they lived so long. I have, on account of its importance, treated this phase of the subject at considerable length, and would say finally that it might be set down as a maxim in forestry that pasturing stock about trees is absolutely antagonistic to successful wood culture.

After all stock are kept out, the older trees will seed the waste places, but as the sod has usually become very tough in most bushes, the seedlings have lessened chances of surviving. It has been found to be the cheapest and best method to break up the land when possible and seed it artificially, or plant it with trees.

Methods of Seeding and Planting.—When possible a good way is to plough up the land and make a seed bed, in which the little trees are grown and tended until they are able to take care of themselves. Tree seeds are not produced annually, but generally every second year, and will not stand drying like other seeds. The nuts and seeds of broad leaf trees are best collected as soon as ripe and packed in moist earth till sown. Chestnuts will be injured in germinating power by drying even for twenty-four hours. The seeds of pines and other evergreen trees may be best kept by gathering the ripened cones in the fall and storing in a dry, cool place till ready for planting. When cultivating the land and seeding is not practicable on account of stumps and rocky hillsides, trees may be transplanted from a nursery or the young seedlings may be taken from the woods. By sowing the seeds in the nursery row and giving them garden cultivation, larger trees may be grown in a given time, but the tap root is cut off and they have a tendency to spread out into branches instead of growing long, straight trunks. Nursery bred trees, when placed on poor soil and left to shift for themselves, are usually overtaken by seedlings under natural conditions. The seedlings grown from nuts have very long tap roots and will not bear transplanting. Nuts and acorns should therefore be planted where the trees are to remain. A method I have found very handy in planting large seeds, such as nuts and acorns, is to punch a hole in the sod about four inches deep with a light crowbar and to drop in the seed and cover it, pressing the earth in firmly with the heel. Plant nuts thickly, using not less than ten or twelve per square rod. This will be at the rate of about one-half bushel per acre of shelled nuts. Seedling trees may often be found growing in great numbers under the shade of the mother trees. These may be removed in moist weather and put in with a dibble when required, putting in not less than four trees per square rod. On lake beaches or drifting sandy wastes, it is often next to impossible to get any useful species to grow. In cases of this kind some quick growing varieties, such as poplar, willow or box elder, are planted as nurse trees, and as soon as some humus is collected about them the seedlings of more desirable trees are planted under their protecting shade. After the useful species have become established, the nurse trees may be cut for fuel and the latter come on and take possession of the soil. Many kinds of seedlings are very delicate and slow-growing during their first few years of growth, and need to be shaded from the scorching rays of the sun. It is for this reason that the best seedlings are usually found in the moist shade of the mother tree. Weeds or any leafy plant will afford a useful shelter for the little trees, but on the other hand if the weeds grow too rank they may shut out all sunlight and starve them. It is well to go over the plantation with a scythe and cut away the weeds where they may be growing too thick and overtopping the young trees.

Kind of Trees to Plant—The question arises, what kind of trees should we have in the woodlot? This will depend somewhat on the nature of the soil, but we should like to have those native species which have the highest market value. The soil of the

woodlot is usually the poorest of any soil on the farm, and rightly so, for of all crops on poor land, wood is that which will give the largest yield.

If the land is high and gravelly, or sandy, it might be stocked with white pine which is the 'king of all forest trees.' However, pine is often found on land that is pretty stiff in texture, but its growth there would be slow. Chestnut is also suited to light, well-drained land and has a high value for furniture, railway ties, posts, &c. Elm by virtue of its present demand for making furniture, baskets, bicycle rims, etc., is becoming a valuable timber, and it has the advantage that it is a rapid grower and will thrive well on almost any land, even where it is too wet for most trees to grow. It has been selling locally for $6 per 1,000 ft. or $9 per cord. Hickory is a tree valuable for its nuts as well as for its timber. Some farmers living near Niagara Falls derive quite an important revenue from hickory nuts grown on their farms. Hickory is worth $12–$15 per cord for making spokes and tool handles. The young trees come into value when not more than 4 or 5 inches in diameter, and the yearly thinnings from a woodlot have a considerable market value. Basswood is a rapid grower and is much used in making carriages, cabinet work, and organs. It is also a valuable honey plant. Ash and maple are much used for interior house furnishing. White oak is at present the fashionable wood for furniture. The cedars can be grown in swamps and places too wet for any other tree, and few trees are more valuable. Where it can be grown there is no more attractive or valuable tree than the black walnut. For use in making expensive furniture it rivals mahogany, and has been known to sell as high as $100 per 1,000 ft. rough.

Mixed Plantations.—Trees seem to do better in mixed plantations than when planted all of one kind, and there is the further advantage that by mixing varieties almost double the number of trees can be grown per acre. Forest trees vary much in the amount of shade they bear. Some, like the beech, the sugar maple, or the spruce, have a dense crown and are thickly leaved down the trunk and in the interior of the crown. This shows that the leaves can exist and perform their work in a small amount of light; in other words the beech, maple and spruce are shade enduring trees. On the other hand, there are trees like the walnut, the chestnut and the oak, which have scanty foliage and do not have leaves inside of or under the crown. This shows that their leaves cannot perform their functions in the shade. Such trees as these are light-needing trees. The shade-enduring varieties can thrive well under the diffused light of the light-needing trees. For this reason we may just double the number of trees per acre by combining the shade-enduring and the light-enduring trees, and the addition of the former will not be a detraction but a benefit to the latter. Under ordinary conditions, trees should stand so thickly that a man with an axe in his hand, would be able to touch half a dozen trees in a circle about him.

Trimming and Cutting.—As soon as the woodlot is entirely under crop, and of the desired varieties, the treatment will consist in taking out the weeds of the forest, or in other words, all trees of inferior varieties, and those that will not eventually make large, valuable timber. Such trees as hawthorn, ironwood, blue or water beech are of dwarf crooked habit and never make valuable timber even for fuel. If there are promising young trees of more valuable varieties that would take the place of these, the inferior trees should be cut away. Such trees as red oak, yellow birch, willow, &c., though of larger habit than the last could profitably give place to more valuable species. However, no tree should be cut unless there are young trees growing under its shade which will in a few years fill up its place. The trees should stand so closely that no grass can grow under them. When the forest shade becomes so scanty that grass takes the place of the natural mould or humus covering, it may safely be said that the trees are not thick enough, and under such circumstances no thinning or cutting whatever should take place. If the forest cover is thick enough all premature trees should be cut out. These may be of valuable sorts but will never make timber of good size or quality. Other trees again are comparatively useless for timber, because they have been started under open conditions, and the trunk is short and branched into many limbs. These trees will never make much but fuel and should as soon as possible give place to better trees. Of seedlings only the most promising should be allowed to grow, but often a

small crooked tree may make a straight upward growth after having its top cutoff, so that its energies are directed into one straight, vigorous shoot.

Forcing Timber.—When the inferior trees are cut away and their places taken by straight, vigorous trees, the management of the woods consists in simply forcing on to maturity the remaining valuable trees. Where trees are grown very thickly, there is a constant competition among them for each to stretch up to the light and to overtop the others. This competition causes them to throw up very long straight stems. The shade of the tops makes the lower and inside branches die and drop off, and the trunks are thus rendered free of knots. By the proper proportioning of the light-needing and shade-enduring trees the latter may be used in forcing the upward growth of the former, while the denser foliage of the shaders will be effective in denuding the other trees of side branches. The shade-enduring species do not suffer from the shade as the smaller light-needing trees would under their mother trees, and so they are forming timber in what would be to the other kind of trees impossible conditions.

Those trees which can overtop the others and get the most light will make the greatest growth, while the continued stretching up of the others will force the leaders in maintaining their supremacy to keep lengthening their trunks. This goes on till the limit of height for the variety of tree is reached. The tree will have a very long, straight trunk, but will be of little value as it has no great thickness. If the surrounding trees which have forced this tree up in height be removed it will develop a spreading top and direct its energies towards growth in thickness. This is the life of a forest tree, and only when it has attained its proper height and developed a crown does it begin to make much wood. When the mature tree is cut out, those trees under it which have suffered from its shade at once begin to branch out and take up its place.

Practical forestry management then simply consists in assisting the processes of nature, and sometimes even in forcing her hand to direct the growth and hasten the maturity of trees.

Professor MACOUN—I do not wish to be speaking all the time, but this paper appears to me too important a one to be passed without comment. I was in southern Ontario during the past summer and the two points that Mr. Hutt made are absolutely true; that is, if you keep the cattle out and get a proper forest floor you make a forest without any work from you at all. He is absolutely correct in that. Again, he is absolutely correct when he says that if you throw your woodlot open and let the cattle pasture in it, you destroy all young trees, and any greenhorn, even belonging to the city of Ottawa, that would go down to Beechwood, could see the browsing lines where the old cow dingles the bell as she reaches up and picks the lowest leaf. These are the two conditions and he is absolutely right. If you want to make a woodlot, fence it in and nature will do the rest—that is, if you have the forest good at the start. I am thinking of two places I was in last year and probably he saw them, near Leamington, in the county of Essex. I was in Oak Ridge and the woods were fenced off and no cattle got in and the whole of the forest floor was just as he describes it. The ground was covered with leaves and twigs and apparently dry; but if you picked up two or three inches of that dead leaf and twig matter, you would find it quite damp underneath, the young trees were from the size of my finger up to a couple of feet, and the older trees were towering away up, and I stood and looked at those lovely oaks and hickories and beech and I felt that I was in a forest that was being preserved. I mention the place, Oak Ridge, about four miles from Leamington. If you go out of Leamington, till you come to a piece of woods near Sturgeon creek, near the boundary there, you get into the other condition he spoke of—a woodlot that has been lying open to cattle, I know for at least ten years. I mean pastured by horses, sheep and cattle. They were there last year when I was there, and precisely that he told you was taking place. There were no

young trees. There were lots of deformed trees, that is, partly dead above and partly living, and a good many dead trees, and whether you adopt Mr. Hutt's plan or not Mr. Hutt should emphasize his two points and nothing more, and go for every farmer on the square, 'If you put your cattle in your wood lot, you will destroy it, and I will prove it to you, and if you keep them out it will be a first class remnant of the forest and it will be a joy to your family for ever more.' These are the two points you must emphasize and the rest will work out itself.

Mr. DAVIES—I may say I am a farmer myself. I was brought up on a farm, and have always lived on one. I had about thirty-five acres of mixed bush, but principally maple, elm, ash and some oak, and of course it was used for sugar purposes in the spring, and my father, said: 'I do not understand why it is that a good many of our trees are dying.' We had pastured it and it was then in pasture. He said, 'Say we fence it up. We will fence it up and keep everything out of it.' There were trees that were nice, tall, and healthy looking. We tapped them and they would run a quart of sap in twenty four hours. After fencing it up for a couple of years, those trees took on a rapid growth and did not die, and to-day and for years, they have been rapid sap-producing trees, with a great flow. Formerly when it was in pasture I could see the sun under all the trees. As the sun would approach sunset you could see your neighbour's property from under the trees, but to-day you cannot see your dog six feet. You can hear him, but you cannot see him. It is so thick, a man can hardly get through it. There are a great many young basswood, hickory, elm and so forth, but the majority are maple. Mr. Hutt spoke about cultivating and tearing up the sod. In one corner of this there was an acre or more of closely grazed grass land, not a tree or stump or anything else. In order to make the field square that was left in. Then when the first settlers had come in there, they had cleared a circular patch in the centre of the woods, evidently to get the trees away so that they could make a nice plot in the place. That was closely grazed. That was so thirty years ago. It was fenced up. This acre of pasture in the corner has grown up with maples today as thick as it is possible to grow. The kind that is natural to the soil will grow there. Nature produces its own kind. In the low spots elm and black ash will grow, and in the high spots beech and maple will grow. This woodlot is a resort in that country for all the little animals, mice, groundhogs, skunks and foxes. It is the only harbour of refuge they have. It is full of them, and it is the only thrifty bush in that country. Two years ago, when the caterpillars destroyed the forests you could not see any perceptible effect on my woods. There was so much little stuff adjacent to the ground that they did not destroy anything. It is true you would see some leaves riddled where they had eaten them, but it did not hurt the trees. Look at my forest and you would see that it was a grand forest, and look at the neighbours' forests and you would see that they were stripped. But I think nature will adjust itself in the matter of tree growing, that if you fence the land up the little seeds will drop into the grass. There was timothy growing in the acre I have mentioned, after it was fenced up. The tree seeds dropped upon the ground, and they took root and managed to live, and the grass shaded them. In two years they were above the grass, and in three years they were still above and killed the grass and the trees are there now without any grass around the place at all.

The CHAIRMAN—The subject of the forest fires of last year was undertaken by the committee. Mr. Campbell undertook to go up and see the condition of the country we

Burnt Forest in Temiscamingue District.

are talking about to-day, and nobody could say that it is anything else than cruelty to send any man into that country to obtain a living from agriculture. It is rock, water and everything else that will not grow grain, but it may grow timber.

FOREST FIRES IN CANADA DURING 1901.

By R. H. Campbell.

The Board of Directors of the Canadian Forestry Association, at a meeting held on September 27, 1901, having under discussion the subject of forest fires and preventive measures, gave instructions that a report should be presented at the annual meeting of the association on the forest fires of the year 1901. It is in accordance with these instructions that the following report has been prepared and is now presented. While the information embodied therein is hardly as precise and full in all respects as might have been desired, still the gentlemen to whom application was made have been very kind in supplying such data as they possessed, and I wish to express to them my thanks, and I am sure I may venture to say also the thanks of the Forestry Association, for the courtesy with which they have responded to my requests.

Taking first Prince Edward Island, it appears that although the forests of that province are now quite limited in extent and though they suffered very much during the past summer, which was specially dry, no effort is made to enforce the Fire Act or check the loss in any way. No investigation has been made into the causes of the fires, but they are attributed to the carelessness of farmers in burning new clearings and to sparks from railway engines, and the remark is made that 'the railway being operated by the Federal government handicaps the provincial government in any measures of restraint it might adopt.' While there are hints in the above statement that the handicap is not entirely due to the Dominion railway and the indictment against it is not supported by any definite items of evidence, the Dominion Association might perhaps be in a position to make such representations to the railway authorities as would assist the provincial government in any steps that may be taken by it. Although trees will grow easily and quickly in Prince Edward Island, those who take an interest in forestry are convinced that their destruction has been carried too far, and that the island is feeling the evil effects of a too complete denudation.

Dr. A. H. McKay, our vice-president for Nova Scotia, was good enough to undertake the collection of data in regard to fires in Nova Scotia, and the reports received by him show that in that province the area of forest destroyed by fire during the year 1901, appears to be at least 15,000 acres, the estimate for Cumberland and Queen's counties alone being respectively 5,000 acres. The lands burned over were mainly forested with spruce and the value can only be guessed at, though one firm in Cumberland county considers that the loss to the province may be fairly placed at $10 per acre. It is impossible to say what was the number of fires started, but the causes are variously given as the clearing of land, the firing of blueberry barrens to restore their berry-producing character, locomotives on the railway lines, fires carelessly made or neglected by hunters and picnicers, while one evidently exasperated forest owner adds to the list, 'pure devilment.' One of the remedies suggested is the appointment of forest rangers by the government during the dangerous season, and the opinion is expressed that the private forest owners would be willing to pay a reasonable tax should that system be extended to their own properties. At least, two firms have already adopted the practice of placing fire rangers on their own properties and are well satisfied with the results. One enterprising firm, in addition to appointing fire rangers, published notices in the local papers in the vicinity of their lands, warning any person or persons against setting fires that would endanger timber lands, and promising on their part to enforce the law to its utmost limit if such depredations were committed and the parties were known.

It is difficult to turn from the interesting reports received by Dr. McKay without entering into questions outside the scope of this paper, but it will be permissible to make the following quotations from two of the communications:—

'We think that ninety per cent at least of the forest fires are preventible, and if the value of the timber destroyed, together with future growth, is taken into consideration, the matter of a salary to proper officers to protect the same would be considered very small.'

'If we could only keep the fires out of our forests, our wood supply for local purposes could be made to last for ages if not for ever.'

In the province of New Brunswick the fire wardens have been able to keep incipient fires well in control. Many fires were stopped by them which if allowed to run would have destroyed large areas of timber lands. The Crown lands do not appear to have suffered as heavily as private lands. The causes of the fires are the same as those mentioned for Nova Scotia, but great difficulty is experienced in securing a conviction even when the wardens are thoroughly satisfied as to the cause of the fire. The Deputy Surveyor General states that the Department of Crown Lands is thoroughly satisfied that the small expenditure made in paying wardens is money well invested and would extend the system to a much larger extent were it possible to devote a larger sum to this purpose. The department employed about 20 wardens last year and expended $2,000 for the service.

The information as to the area covered by such fires as have occurred is incomplete. His Honour J. B. Snowball has kindly furnished an estimate for Northumberland County which shows that in the eastern section, mostly near the coast, an area of 23,900 acres of Crown lands and 18,000 acres, half of which is Crown lands, or a total of 41,900 acres, were fire swept. In the larger part of this county the fires were thirty or forty miles from any railway and in most cases they were caused by the carelessness of settlers in clearing land. There were fires on granted lands in Westmoreland and Kent counties, but I have been unable to get any estimate except that in the eastern part of Westmoreland County 700 to 1,000 acres were burned over. The value of the timber destroyed may be placed at the same figure as for Nova Scotia.

For the present let us make a long stride to the Pacific coast and look at the province of British Columbia, and for information in regard to this province special thanks are due to Mr. J. R. Anderson, Deputy Minister of Agriculture. British Columbia's forests are of such great extent and the value of lumber has up to the present time been so low that the necessity for a fire protection service has not made itself sufficiently felt to have brought about the organization of a special force, but all officers of the government have the duty of enforcing the Bush Fire Act expressly laid upon them. It should be explained that what is usually called the railway belt, being a belt twenty miles wide on each side of the main line of the Canadian Pacific Railway, is owned by the Dominion government, the timber thereon is under Dominion control, and the Crown timber agents have authority to call out fire rangers as they may be required. From the smoke which made itself evident during the late summer it was supposed that there were severe forest fires occurring, but the reports received do not show as serious a condition of affairs as was feared. On Vancouver Island several small fires occurred, but did no damage of importance. In New Westminster district there were a number of bush fires, but chiefly in places where there is no valuable timber, although in one place it was only by a determined fight on the part of the Dominion fire rangers that it was kept out of good timber. Private information has been received, however, that there were very serious fires in the valley of the Chilliwack in August and September. In the eastern part of South Yale no serious fires were reported, but in the Kamloops division of Yale, on the railway line, 5,000 acres were destroyed, though in this estimate was not included a fire started by a settler clearing land which destroyed a large area of valuable timber. Ten different fires there during last year, one of which destroyed an area of 2,000 acres, were traced to locomotives. Only two fires are attributed to settlers clearing land. Indian camp fires are suggested as the cause of fires which were too far from the railway line to be investigated. In the Lillooet district, the central district north of the railway, the early summer was very wet and consequently no fires of any consequence occurred. This

district was entirely fire-swept over thirty years ago, but is now thickly clothed with a dense young growth of pine and fir.

From Omenica, on the head waters of the Peace river, well north of the Yellow Head Pass, which is the proposed route for the new transcontinental railway, comes a report that only one bush fire occurred there, running over a small extent of country and destroying timber of no value. The reason why no valuable timber was destroyed is given in the following interesting quotation from the report :—

'The greater portion of the Omenica district has during the past twenty-five years been overrun by forest fires which have destroyed vast amounts of valuable timber. The burned area extends more or less from the summit of the Fire Pan mountains on the west to the Parsnip river on the east, and from near Fort St. James, Stuart lake, on the south to the head waters of the Findlay river on the north. The probable cause of the greater number of these fires has been the gross carelessness of the miners and prospectors in the early days leaving their camp fires burning when breaking camps. The Indians, too, are responsible to a great extent for the country being burned, but I think it safe to say that the greater part of the country has been burned by white men.'

As far as can be judged from measurement on the map the tract mentioned in the above extract is about 100 miles square, or an area of 10,000 square miles, and this is in the district which Professor Macoun described at the last annual meeting as bearing a wealth of pulpwood beyond the imagination of any one present. This suggests the possibility that when we get to where these inexhaustible sources of wealth are supposed to be they may not be there.

In the Rocky Mountain district a fire, supposed to have been started by a tramp, occurred at Laggan on August 27, and burned an area of about two miles square of mostly dead timber. The fire ranger, with the help of men from the Canadian Pacific Railway, kept it fairly well in check until it was extinguished by rain. A fire also occurred on the Crow's Nest Pass Railway between Crow's Nest and Fernie, but it has not been possible to obtain particulars as to its extent.

It will be seen that the information in regard to British Columbia covers mainly Vancouver Island, the southern coast districts and the line of railway. In regard to the Kootenay district and the eastern and northern parts of the province generally the reports are very meagre. It is impossible, therefore, to make an estimate which would be even approximately correct of the area and value of the timber destroyed.

Mr. Leamy, the Crown timber agent for the railway belt in British Columbia, says in a recent letter: 'I would strongly urge the appointment of four more rangers next season. Our rangers, I am pleased to say, did very good work last year in preventing fires; and, in fact, had it not been for the manner in which the country was looked after by them, we would have had fires equal to those on the American side of the line which destroyed a large quantity of timber just across the line.'

In the North-west Territories a fire occurred about five miles north of Blairmore Station on the Crow's Nest Pass Railway in Southern Alberta. It burned fiercely for some days and had reached within six miles of the limits of Hon. Peter McLaren when it was fortunately checked by rain. It was understood that it was a prospecting party that started the fire.

In the Saskatchewan district the season was wet and the only fires reported are one in May, which did not do any damage to green timber, and one which ran over about fifty acres of the Snake Plain Reserve and which was started by children at play. The chief dangers in this district have been from freighters and Indians, and much damage has been done to the forests, but they are growing again and with care may yet be of much value. The settlers understand the value of the wood supply and are anxious that it should be preserved. The timber is principally spruce and Banksian pine with poplar.

In the district of Assiniboia three fires occurred, two between Arcola and Carlyle on the 2nd and 5th of November, and one between Carlyle and Manor on the 5th of November. These fires are reported to have been started by sparks from railway engines. The farmers in the district were put to great inconvenience fighting these fires which destroyed over 180 tons of hay and the grass over about 100 square miles. This feed was required for horses running out over winter and for cattle in the spring and

fall. It was only by great exertion that this fire was kept out of the Moose Mountain timber reserve. It may be added that most of the fires in this reserve are reported to be caused by settlers who go a long distance for wood camping out and leaving fires burning behind them.

In the Turtle Mountain reserve the chief difficulty has been from fires coming across the international boundary. The spring was very dry and there were many fires to fight (at least eleven), but fortunately only one got into the reserve where it burned over a section before it could be arrested. Other fires were started by some person burning the muskegs for hay and by Indians hunting muskrats. The timber is mainly poplar.

In the district surrounding the Riding Mountain timber reserve, one fire, which started on May 29th on section 27, township 22, range 27, burned over 320 acres destroying about 6,000 cords of wood; two fires started on the 20th and 23rd May in township 22, range 17, did considerable damage to young timber, cause unknown. On the east slope of Duck mountain a fire started on the 26th May in township 28, range 22, supposed to have been caused by hunters or trappers out on a bear hunt. This was in timber previously fire killed and was found very difficult to fight. It may be remarked that many of the reports emphasize the dangers caused by dead timber and old slashings. On the south side of the reserve one of the men bringing out a drive of logs on Clearwater creek set out a fire which ran up the creek for two and a half miles, burning a strip varying in width from a few yards to one-fourth of a mile. The timber is spruce and poplar.

On the east side of the Red river there were a few small fires which were more destructive of settlers' property than of the woods.

The work done by the Dominion Fire Rangers has undoubtedly been instrumental in preventing much damage that would otherwise have occurred. No estimate of loss can be made, as very little green timber was burnt. The total cost in connection with this work during the past season on Dominion Lands was $5,278.90.

In regard to the province of Ontario, I may quote from the Annual Report of the Commissioner of Crown Lands, as follows:—

'The past summer was the first since the establishment of the Temagami forest reserve, referred to in my last report. Early in May a staff of seven fire rangers and three assistants were placed on duty in this reserve. About eight fires were reported during the whole season, and these were all extinguished before any damage was done.

'The reserve in the township of Sibley has been placed under the charge of the Crown Timber Agent at Port Arthur. No fire occurred on this reserve. In the Eastern forest reserve two fires occurred. They burned over only two or three acres, however, before the ranger on duty succeeded in stamping them out.

'The number of licensees who had fire rangers on their limits last year was 76. The number of rangers employed on licensed lands was 236. In addition to the rangers in the Temagami and Eastern forest reserves, there were ten rangers employed on the Crown domain in the Wahnapitae and Jocko river countries and in the district of Rainy river. The total expenditure of the department, covering one-half the cost of the staff on licensed lands and the whole cost on unlicensed lands, was $29,624.62.

'In the Rainy river and Thunder bay districts the rainfall was slightly greater than in previous years, but further east the summer was exceedingly dry. No fires of any account occurred in the western part of the province; in fact, on any pine lands owned by the Crown, except one small fire in the Michipicoten country. On licensed lands, from the reports received, the fires which did any damage, appear to have been few in number, and the amount of timber destroyed was small indeed. The most serious fire, perhaps, was the one in the Peterborough district, which damaged about 30,000 saw-logs and destroyed some valuable river improvements. It is understood that the damaged timber is being taken out this winter. The licensees, who, as is usual, were asked their views as to the work done, and suggestions in the direction of strengthening the system, expressed satisfaction with the service as now constituted.

'In the Temiscamingue district a fire broke out early in July, due, it is believed, to smouldering brush heaps left by settlers which were fanned into flame by a gale of

wind. No great quantity of pine was damaged ; the timber there is principally spruce and other soft woods. A tract of about 44,000 acres in extent was overrun by this fire, or rather fires, for several sprang up in different places. Serious loss of buildings and effects was experienced by some of the settlers, many of whom were new in the country.'

Permit me also to give the following quotation from a paper by Mr. W. A. H. Findlay, the Secretary of the Department :—

'In the year 1896 it was noted by the Director of Forestry that during the previous summer on 49 limits from which reports had been received only 93 fires had occurred, by which upwards of 59 millions of feet of timber had been destroyed or damaged, representing over $40,000 in value. The province was then congratulated on the efficient work done by the rangers, in the absence of which greater damage would undoubtedly have resulted. But let me point out that during the summer of 1901 on the limits of 50 representative lumbermen, covering a vast area of country in all parts of the province, the fires that caused any damage worth mentioning could be counted on the fingers of one hand, and the value of the merchantable timber destroyed would be covered by a thousand dollar cheque.'

In the region beyond the care of the fire rangers the result has not been so happy. In August a fire occurred on the Missinabie river which followed its course downward from Skunk island for fully 100 miles, burning on both sides of the river, and must have had a width of at least thirty miles, which would mean that the timber, over 3,000 square miles, was destroyed. The season was very dry and apparently three different fires were started which burned so as to make the destroyed areas contiguous. The timber was not of much value, except that which occurred in the river valleys, and it may be considered fortunate that no such conflagrations took place in the best timber districts.

The following statement of the character of the country from the report of one day's exploration of survey party No. 4 of the parties sent out by the Ontario government in 1899 may be of interest :—

'First five miles, muskeg covered with scrubby spruce and a few tamarack ; 6th mile, rocky ridges timbered mostly with poplar and spruce of good average size and healthy looking ; 7th mile, a little higher land and larger timber mostly spruce ; 8th mile, low and muskeg, intersected by a small creek fifteen feet wide with larger timber, principally spruce, which would cut about twenty-five cords per acre ; 9th mile, higher land and larger timber ; 10th mile, high, good land, timber principally poplar mixed with spruce and balm of Gilead of a good large size, the spruce would cut about thirty cords per acre and other timber about fifteen thousand feet board measure per acre.'

In the province of Quebec, Fire District No. 2, which includes the St. Maurice and Gatineau districts, appears to have escaped any serious loss. Very few fires occurred, the only one in which any estimate of the loss is made being one on the Lievre river, and in that case the amount is only $1,000. The number of rangers employed in this district for last year was twenty, and the superintendent asks that it be increased to twenty-five. He also suggests that in this district the setting out of fires be prohibited between May 1 and September 1, instead of as now between June 15 and September 15.

In Fire District No. 1, which includes the Upper Ottawa and Temiscamingue districts, the year has not been passed through so fortunately, however. Over thirty fires occurred, requiring a special expenditure of $8,000 for fighting them. Thirty per cent of these fires were caused by settlers, and fully fifty per cent of the loss sustained resulted from the same cause. Seventy-five per cent of the fires occurred during the latter part of June and the month of July which was a very dry season. The total loss by fires in this district during the past summer might safely be put at 200,000,000 feet. The Quebec authorities have complaint to make against Ontario for inadequate protection of the district near the boundary north of Lake Temiscamingue as a result of which there was very grave danger of a serious fire in that district.

Other fires which did much damage are, however, dwarfed by the conflagration which has attracted special attention to this district during the past year, now known as the Great Temiscamingue and Hay Bay Fire. Beginning about June 26 in

the township of Fabre, clearly from fires set out by a number of farmers for the purpose of burning logs on Lavallee creek and Young creek and which ultimately united, this fire ran in a south-westerly direction with the wind over limits held by Booth, Gillies Bros., Lumsden and the Hull Lumber Company. The area burnt upon the holdings of one firm alone was over forty square miles possibly nearer double that area. The quantity of mature timber destroyed in this area is estimated at 25 to 30 million feet, while as much more would have been fit to cut in 15 or 20 years. Very little of this timber was saved and the present loss may easily be estimated at $300,000, a large proportion of which would have gone in wages and other expenditures, while the share of the government would have been fully $27,000. The fire protection service for the whole province for one year costs only $7,000. On another limit about five million feet of timber were destroyed, a fair proportion of which was saved. There were other losses of which I did not obtain an estimate. The direct loss in stores and buildings is at least $6,000 and the special expenditure by the government for services in fighting the fire $4,000. But even that is an inadequate presentation of the destruction that has been caused. Birds and game were suffocated in the smoke, human life was threatened, the beauty of scenery was destroyed, countless numbers of young trees, the revenue producers of the future, were killed, and the underlying rock has been bared of the covering of vegetable mould gathered painfully for many years. It simply means that for this generation this tract of country as a revenue producing factor has been practically wiped out of existence. The Canadian Forestry Association will have celebrated its centennial, its present members will have long passed into history or oblivion before a forest such as existed previous to the fire can be reproduced, and the land is mainly of such a rocky character that it can be made of little use in any other way. Add this destruction of the timber and timbered lands within reach to the 3,000 or more square miles cut out of that part of our 'inexhaustible store' which Ontario puts down to her credit in the regions beyond, and it may be worth while considerering whether we have not been so busy gazing after the two birds in the bush that we may chance to find, that both they and the one in hand may have slipped from us when most needed.

As it has been stated that the evidence is clear as to the cause of the fire, the clause of the Fire Act covering the case may be cited as follows:—

13536. No person shall set or cause to be set or started any fire in or near the woods within any such fire district, between the first day of April, and the first day of November in any year. Nevertheless a bona fide settler, under a location ticket or letters patent from the Crown, may do so, for the purpose of clearing land at any time, *except in fire district number one, between the first day of May and the fifteenth day of September*, and in the other fire districts between the fifteenth day of June and the fifteenth day of September.

An investigation into the cause of this fire was made by the Quebec government and I quote from the report submitted as published in the Annual Report of the Department of Lands, Forests and Fisheries:—

'In the light of past experience, and the fact that the most disastrous of these recent fires, viz.; the Temiscamingue and Hay Bay fire, was caused by the careless use of fire by a number of settlers in the township of Fabre, on Lake Temiscamingue, some additional measure should be adopted with the view of restraining settlers from setting out fire during an extremely dry time, when a fire is as sure to deprive the lumberman of his forest as it is to deprive the settler himself of his best asset, the surface soil.

'Rangers should be clothed with greater authority to deal with new settlers who have themselves but little to lose, but whose criminal carelessness too often leads to the ruin of other people's business, besides depriving the government of the forest revenue.

'At present the lumbermen and the Crown run nearly all the risks but the settlers very few.

'The settler by all means should be encouraged in every possible way, but on lines that will consult the interest of others concerned as well as his own. While settlements like those under consideration are connected by brulé or waste lands with valuable pine forests, the matter of putting on fires at certain seasons of the year, should be made to

depend entirely on the concurrence of the fire ranger or the mayor of the municipality or both.'

While it may be considered that with this review my task is closed, I have thought it well to indicate briefly some of the preventive measures suggested with the object of directing any discussion that may be held into practical channels. The main causes of fire stated are settlers clearing land, hunters, railway locomotives and prospectors. The lines of defence proposed are :—

1. An effective law with adequate penalties.

2. A proper advertisement of the law by posters on main routes of travel, distribution of copies of the Fire Act, &c.

3. Enforcement of the law. This is undoubtedly attended with difficulties. Evidence for conviction is not always easily obtained ; but there is no question that in this respect great laxity is shown even when the evidence is clear. Prohibitory laws are not usually popular with those whom they press upon, and unless there is a strong public sentiment supporting them, the executive will be inclined to let the opinion which is most directly and actively interested prevail in its councils.

4. Public opinion should be educated by making known as widely as possible the great value of the forests, their importance as income producers, Canada's leading place in supplying the world, the fearful and almost irremediable loss caused by fire. If Arbor Day, which is celebrated in our schools, were made an occasion for impressing these facts upon the children, the future generation, whether as settlers, hunters or otherwise, would be more apt to have a larger grasp of the subject and take such precautions as would prevent fires occurring. Information on these subjects should be made available for the schools.

5. Hunters who are not used to the woods are very unlikely to realize the danger a small spark may cause. The game protection associations might do much to call attention to this subject. Some means might be taken also to have the guides who go out with hunting parties look after the prevention of fires.

6. The railway locomotive has been responsible for a share in starting fires. In England the use of spark arrestors of netting has been given up, some device in the firebox being depended upon, but the netting is in general use in this country and is considered a necessity. Locomotive builders state that with a proper spark arresting device in proper order any sparks which could escape would be too small to do any harm, and they do not consider that it impairs the efficiency of the engine. It may be doubted, however, whether on steep grades and with time to make, anything which seems likely to be an impediment to the draught does not have to give way. The clearing by burning or otherwise of a strip 150 to 300 feet along the railway, with, where possible and particularly on the prairie, a ploughed fire guard on the outside, is also an important and comparatively easy preventive measure.

7. From every quarter come commendations of the fire warden system. The educative effect of the work of the guardians in advertising the provisions of the law as well as their direct work in extinguishing fires have unquestionably been the most effective step taken, and the small amount spent on this work is hardly worth mentioning in comparison with the great interests involved. Forest fires are, however, only controllable when caught in their inception, and therefore it is necessary that the district of the ranger be not too large and that the whole territory where there is danger to valuable timber be guarded, whether it be covered at the moment by timber of merchantable value or not. The governments must undertake to have this done.

8. The setting out of fires for clearing land should be under more careful direction. Where possible the assistance of the municipal authorities should be enlisted in controlling the matter, or the fire guardians should be given more direct authority in connection with it.

9. The setting apart of timber reservations and the defining of the tracts that are to be held for colonization and for timber growing respectively is an absolute necessity.

Possibly this, though an inadequate presentation of the subject, may do something to call attention to what is undoubtedly the first step of any forestry system, the prevention of forest fires, and may help to an appreciation of the conditions involved in the problem.

The CHAIRMAN—Professor Fernow is in the audience now, and I will ask him to take the platform. Dr. Fernow will lecture to-night. I will not be able to be present, but I can assure you all that the reason why American forestry stands in the position it does to-day is largely owing to the practical knowledge, intelligence and enthusiasm of Dr. Fernow. This paper, which has just been read, as I said a moment ago, was prepared by instruction of the board of directors, but the compilation and collecting of the information have been done by Mr. Campbell, and I think he is deserving of a vote of thanks for his very able work in getting this up.

Mr. HIRAM ROBINSON—I move a vote of thanks to Mr. Campbell for the able report he has presented to us. I know he has taken great pains to secure the information. He has visited the grounds, and secured a great deal of the information which he has given in that report, as well as through letters and other means, he has made a very excellent and valuable report.

Dr. WM. SAUNDERS—I second the motion.

The motion was adopted.

The CHAIRMAN—I regret to say that I am called home. I must be in Montreal to-morrow morning. I will miss the lecture to-night. I ask Mr. Hiram Robinson to take the chair in my absence.

Mr. HIRAM ROBINSON then took the chair. He said; I am very sorry our vice-president is leaving. We were sorry at first that our president was not with us. He is now in British Columbia, and cannot possibly be with us at this meeting. We now regret very much that Mr. Little has to leave. You did me the honour to elect me chairman pro tempore this morning, and I resume the position now. Mr. Campbell's paper is before us for discussion. It is a paper we should give the most serious consideration to, and we will be glad to hear any remarks from any of the audience with regard to it.

Professor MACOUN—I think somebody ought to speak on this matter. I do not want to be on my feet to speak in connection with every paper. But this is a paper which surely interests every one of us as showing the enormous destruction. Can no one say anything about it? Can we not emphasize the value of that paper when we see that in every province there has been destruction in the past year, and nothing done in the matter of bringing the guilty parties to justice? I cannot understand it. If I were personally interested in the matter, I would hardly sleep at night until I could get something that would be effective brought forward. I consider this report of more value than anything else that has come before this meeting, and it is our duty to take some measures to try and make the fire protection more effective than it is. A few thousand dollars were paid by the Dominion government, and look at the saving. Look at how the fire first started, and look at the loss. If this thing is worth doing, it is worth doing well. I am glad that we moved a vote of thanks to Mr. Campbell for preparing this paper. I should like to make a motion that the executive each year arrange to have a report of this character submitted to the meeting, and that we should have them as records of what we are trying to do. We are trying to enlighten the community in regard to forest protection, and I think we cannot do less than have such a report as that each year, and I therefore move, if some gentleman will second it, that we make provision for such a report each year.

Mr. MacWilliams—I second this proposition, and perhaps, as superintendent of the woods and forests of Ontario, I am in a better position than any man to judge of the damage by fire. I am safe in saying that more has been destroyed by fire than has been taken out by lumbermen. If we could settle the question of fire protection brought up by Mr. Booth, the forestry question would be solved. It only requires skill, energy and exertion to do it. In 1874, I think, I was the first man to recommend a system of fire protection. It took eleven years before Ontario adopted it, and they only adopted it on a small scale. You see the extent to which it has developed. We have spent already $30,000 this year in protecting the forests, and if that system were more thorough and our province divided into different sections, and the fire rangers employed by the lumbermen, and if the government placed a forest ranger in charge in each section to see that the work was properly done, there would be very little danger from fire. I think the lumbermen are to blame themselves in regard to fires on account of the class of men they employ. In travelling through the country I find that lumbermen, in place of having experienced rangers, will place some old man in charge of the camps who has perhaps planted a few potatoes, who is drawing his pay, instead of employing an experienced man who can go into the woods 200 yards without being lost. That is the system that should be adopted and put in force, and prosecutions should be made and the penalties enforced as provided by law. The question brought up by Mr. Booth is an important one. I have advocated that each section of the country should be explored, and if the land is not first class farming land fit for settlement, it should be closed from settlement entirely. I think it is only right to the settlers to do that. A great injustice has been done to the poor settlers by sending them into timber lands where it is impossible for them to make a living. Take the Burlington road, the Buckhorn road, and all these roads, and see the desolation along these roads, which were built for the purpose of opening up the country, and see the poverty which has existed among the farmers there. If this association will take hold of the matter and appoint a committee and lay the matter before the local governments, I think it would result in a great saving to the country and to the lumbermen. It is unfair to Mr. Booth, who has paid over $650,000 for a limit, to allow settlers to go in there, because the consequence of these settlers going in there may be to destroy the limits by fire. I think the government should protect these limits by having an investigation made, and permit no settlers to go in there until the timber is removed and the land is found to be fit for settlement. It is only right for the protection of the settler and the lumberman, too. A committee of this association should take the matter up and press it on the government. I think that is the best way to move in the matter. It can only be accomplished by having pressure brought to bear on the government by men who know what they are doing—practical men. The government have not had experience in forests and must get their knowledge from others, and if a good, strong committee, consisting of the leading lumbermen, was formed to lay the matter before the government, some action might be taken which would be beneficial.

Mr. J. R. Booth—I am delighted to hear the remarks of the last speaker. They are entirely in my line. I think the only way that settlers can be prevented from doing harm is to prevent them going into a country that is not fit for settlement. It is entirely in the hands of the government. If they have surveyed any townships that are not actually fit for settlement, they should withdraw them, in my opinion. They should not survey any township that is not fit for agricultural purposes. There may be lots of odd places here and there that they will find settlers to occupy; they may open

up the country for settlement and advertise it, and you will find men that will go in there if they can raise a bushel of potatoes to the acre. It is simply because they know they can go in there and get a large amount of land, whether it is any good or not. I say it is an injustice to the settler to permit that. There have been many settlers encouraged to go up into this Ottawa country who have been beggared after their hard life's work—not only themselves, but their families. They were not able to make a living and had to leave it. That is not justice to the settler. There are plenty of lands to be settled, where a man can make a living, and I say it is in the hands of the government to prevent settlement on lands totally unfit for it. It is not possible for the government to open up a country, allow settlers to go into it, and then place restrictions on the farmer which would prevent him setting fire. I say that is utterly impossible. It has proved so all the way through the Ottawa district. The only way is to keep the men out of that sort of country. I do not wish it to be understood that I am opposed to settlement, but it is not justice, it is not treating any poor man right to let him locate on land where he cannot hope to make a living for himself. I say it is not justice to him to encourage him to go into a country like that. We have in Canada large areas that have been burnt over and cut over, and yet I look upon them as very valuable. I say it is a country that is still worth saving, although you can go in there now and cannot find any old growth pine, yet there is a young growth coming up which is very valuable. They have the same thing in the New England States. They cut off their old pine there. They have their high mountainous land and hills which are not fit for agricultural purposes. That country has grown up with young pines, and there is more pine to-day in the New England States—take Vermont, Massachusetts, New Hampshire and Maine—there is more pine in them than there was thirty or forty years ago. There is an establishment at Burlington, Vt., with which we have competition with that young pine in its second growth that is cut every year. It is the strongest competition we have in selling our lumber in the New England States. What will our country be worth in thirty or forty years when this timber grows up and becomes fit to cut the same as that? I am cutting in a country this winter that I am sure, from the growth of pine, was burned over may be seventy, or eighty, or a hundred years ago, but the timber is standing just as thick as it possibly can stand. It is not a very good quality, to be sure, but it is sound, and you can go through and see that this is a country that has been burned over some time long ago. That is only an instance of what all this pine country would be after a while. It is not only our duty to preserve the old growth timber, but to preserve the young growth. In my opinion, in fifty or sixty years, the country we have gone over will be worth as much as the old growth was in the first place, and it is our duty to protect that. As far as putting restrictions on the farmer as to what time he shall set out fire are concerned, I do not believe you are ever going to protect the forest in that way, because, in the first place, supposing he does set it on fire, what can you do? He is not a responsible man. You can put him in jail, but what good will that do? The only way is to keep him out.

Mr. E. STEWART—I just wish to say that I think Mr. McWilliams' suggestion is one that we should act upon. We may come to this meeting and discuss those matters in an academical way, but what good will it do unless we bring some pressure to bear to carry out the views, and I think that the very object of the establishment of this association was that it should stand behind those who were endeavouring to work out a system to benefit this country in the way of forestry. I think he mentioned the provinces, but

in speaking in the eastern provinces nearly always I have to point out that the Dominion government has under its control certainly a very much larger area of timber than all the provinces combined. It is generally thought that the North-west is all prairie —not generally thought by those who know,—but the general public has no idea of the enormous area of timber in the West, extending along the foot hills of the Rocky mountains, and away to the North, and to the north of this province as well. Mr. Booth has spoken of what we were discussing before—that is, the necessity of setting aside certain areas for the production of timber, and other districts that may be laid out for agriculture. I think that is perhaps the most important subject that could engage the attention of the legislatures of the different provinces, where they have new territory, and certainly one of the very greatest importance to be dealt with by the Dominion government. We are now sending out immigrants to that western country, they are going in faster than ever, and it seems to me they should be directed in the proper channels suited to their former avocations, and not into a timbered district. In a country where timber is so scarce it should be preserved to supply the prairie where the scarcity exists. We have set aside over a million acres for the cutting of timber alone in north-western Manitoba. Manitoba is considered a prairie country, but over half of it is wooded. I do not say that it is wooded the same as the Ottawa valley, but west of Lake Winnipegosis, between there and the boundary there is larger spruce than I ever saw anywhere else except in British Columbia, and to keep the fire out of that district is a matter that is engaging our attention quite as much as in the older provinces. I do not want to detain the audience longer, but this exploration and this setting aside of certain territory for the production of timber, and guarding it after it is set aside is an important matter. Several years ago I remember that in a certain society of which I was a member, I made a motion, and a resolution was passed that we should have an explorer to precede the surveyor and see what land should be surveyed. I said it was a waste of time, to have a surveyor go through a district not fit for settlement. The settlers went in and they became dissatisfied and it gave the country a bad name. We appointed a committee and interviewed the government, but nothing was done. That is ten or twelve years ago. I am happy to say that in the last two years there have been explorations in this country, and we need more of them, and I think this association will only be following out the very design of its founders if we make something practical out of this and endeavour to press upon the governments the necessity of taking up this subject. Mr. McWilliams mentioned the provinces and I hope he will include the Dominion as well.

Mr. McWILLIAMS—I meant the Dominion as well. We had a practical test a few years ago. A lumberman owned a large timber limit—one of the finest I ever saw anywhere. There was a keen competition between the Crown Lands Agent and another gentleman as to the reeveship. Sometimes one was in, sometimes the other. The Crown Lands Agent put some men in on this fine limit as settlers—on this pine timber reserve. I went and pointed out the absurdity of having them in there, and spent five hundred dollars in selecting land and removing all these parties to it, and after I returned I told the Commissioner of Crown Lands, and he said that this lumberman should pay this expense, I went to him and told him and he said 'Yes, and ten times as much as was spent'. That timber was protected, and if these men had not been removed, I am satisfied the whole of the timber limit would have been destroyed. It is only by such action that timber limits could be protected.

The CHAIRMAN—Mr. Stewart is preparing a resolution. There are parties who are pressing upon the government, perhaps in different lines from ours, and our governments require support in what they are quite ready to do themselves, to help them to come to a proper conclusion with regard to saving those forests from being burned up. I speak now with regard to these lands that are not fit for settlement, and that it would be a hardship to put settlers upon those lands. We should be glad to hear what any other gentleman may have to say.

Mr. GEORGE JOHNSON—It seems to me that to get down practically to business in a matter of this kind, we ought to have some kind of investigation, and I move that it be an instruction to the directors that this matter be investigated, and a paper or two prepared for the next annual meeting, and full information for both sides—because there are two sides to this question—and we would be in a position then to press the views of the Association upon the several governments that are interested.

Mr. A. C. CAMPBELL—I second the motion.

Mr. E. STEWART—I would make the suggestion that a committee be appointed now to take up this matter, and I do not think we can go wrong in allowing that committee to impress upon the different governments, by resolution, or by visiting them, the necessity of exploration in advance of settlement, and of appropriating or dividing or retaining, I would rather say, certain areas of country that are better adapted for the growth of timber than for agricultural purposes. I may say without betraying any confidence at all, that officially I am constantly urging this on the attention of the government. I do not think the government is deaf to it at all, but it would be the greatest benefit to have the weight of this association to assist in carrying it out. Of course we might leave this over and consider it a little more definitely afterwards, but I feel that it should not be lost sight of, and that we should appoint a committee. I do not know whether we had better name the committee now, but I do not think we should lose sight of it.

Professor MACOUN—There is a motion before us now. I moved, seconded by Mr. McWilliams, that the directors be instructed to have a report prepared for the next yearly meeting, in reference to the fires that take place during 1902. I do not think that should be overlooked.

The CHAIRMAN—I understood that was included in the other.

Mr. E. STEWART—With all due deference to the members of the executive and the directors of this association, I think it would be a wise thing to have a committee appointed at once. We had better, perhaps, take a little time and make a report to the different provinces and to the Dominion as well. The proposition is to merely have the directors submit a report at the next meeting—that is a long way off, and I think we can do something in the meantime that will be of benefit.

Professor MACOUN—My statement has nothing to do with yours. It simply means to have another report of the same character that we received this year from the executive.

The CHAIRMAN—I do not know whether that motion was seconded.

BURNT FOREST IN TEMISCAMINGUE DISTRICT.

Mr. McWILLIAMS—Yes, I seconded it, and that is how I came to make the remarks I did. I did not make any motion. I threw out the suggestion.

The motion was adopted.

Mr. McWILLIAMS—I do not think there are two sides to this question at all—at any rate not to the suggestion I made. If land is unfit for settlement, there is no question that you should not allow settlers in there at all. I do not ask to set aside land that is fit for settlement, but that the land should be explored, and if there are only a few thousand acres fit for settlement in a township, I do not think settlers should be sent in there to destroy all the timber of a township. We might suggest names for the committee, and they might deal with the matter to-night, or it might go over till to-morrow. Perhaps each gentleman might think it over till to-morrow, and the matter can be taken up then.

Mr. GEORGE JOHNSON—I have no objection whatever, but I want to get down to business in the matter, and dispose of it. I said there was another side to the question—and there is another side to the question—at any rate there are people who say there is. We probably agree, but there is a side that other people talk about, and we are all agreed that this association can do a great deal if it takes hold of the matter in a business-like way, and it seemed to me the business way to dispose of this by a motion such as I made, which can be voted down, or an amendment proposed to it, or supported and when we have got that done, we have done our duty.

Mr. THOMAS SOUTHWORTH—There was a suggestion that Mr. Johnson's motion should be postponed till to-morrow. I think we should take some action before next meeting, and I think that the acting Chairman, Mr. McWilliams, and Mr. Johnson might suggest some proposition that would indicate prior action to that, and not wait so long before doing anything in the matter, and I would ask Mr. Johnson to withdraw the proposition till to-morrow morning.

Mr. GORMAN—Putting it off for a year delays it a long time. The fires occurred last year within a short space of time, and the same thing might occur this year if steps are not taken to prevent it, and I think Mr. McWilliams' suggestion is the proper thing—to appoint a committee at once and not leave it for a year. I trust Mr. Johnson will accede to the request and leave it over till to-morrow, and in the meantime he will consider the advisability of allowing Mr. McWilliams' motion to carry and not put his as an amendment to it, and I hope that when his motion is carried it will be an instruction from this association to that committee that a recommendation should be made to both the Ontario and Quebec governments, at least, that in addition to the present fire rangers they should appoint special fire rangers to stay in those new settlements and see that no fires are put out during the prohibited season.

Mr. McWILLIAMS—There is a question I should like to refer to, not so much in that line as in the line of the address given by Mr. Hutt. With reference to the number of trees destroyed by insects and caterpillars, has any gentleman made any experiment of killing them without spraying—any other treatment?

Mr. W. T. MACOUN—I do not understand the question.

Mr. McWILLIAMS—An old gentleman in the town in which I reside is treating trees in a different way—by some chemical process. He has a quarter inch bit and bores a

hole into the tree and puts some chemical into the tree, and in a great many cases he has killed off the caterpillars. I had some fruit trees and some hickory trees, and for years these did not grow at all as the leaves were destroyed. I had not much faith in this remedy, but I tried an experiment with these trees and it turned out a complete success. I do not know whether any one else had ever experimented in that line. It is an experiment well worth trying. I do not know what chemical he uses, but some years ago the caterpillars were very bad—they were all through the orchard, and after he used this remedy there was not a caterpillar to be seen, and it has not caused any injury to the trees. He has a quarter inch bit and bores a hole into the tree and puts some stuff into it which kills the insect.

Mr. W. T. MACOUN—I have never heard of any reliable remedy applied in that way. I do not think there is any reliable means. He has tried an experiment, but I think the caterpillars must have died from some other cause.

Mr. MCWILLIAMS—The caterpillars are all gone.

Mr. W. T. MACOUN—The caterpillars died off last year in great numbers. A great many people think it is caused by something else.

Professor MACOUN—I am quite satisfied if it was a poisonous substance which would kill a caterpillar on the leaf, if it was put into the tree it would go into the fruit as well, and if it is a poisonous substance which would kill the caterpillar, the fruit would be affected, so that it is dangerous.

Mr. A. M. CAMPBELL—I spent four months in the Temagami district, and I wish to testify to the remarkable success of a handful of men, the chief game warden and eight or nine men, in protecting the new Temagami Timber Reserve, and also to say that as far as I could learn, having been on the spot all summer, I think four fires which occurred were caused by lightning, and one to which Mr. Southworth referred,—and I am satified the others,—were caused by camp fires of parties who were accompanied by guides from outside, who were not interested in the region and did not care whether fire occurred or not. The natives are remarkably careful, and I think in a measure they fully realize that the timber the region produces and will produce in the future will mean work and money for them. The guides going in there with these sportsmen ought to be licensed in some way or other by the government, and only natives engaged as far as possible, because they could be held responsible for fires which occurred as a result of their work. It is really remarkable that these eight fires, which could have caused millions of dollars of damage, were checked in the way they were. There was one fire caused by lightning in one of the best parts of the reserve, which is one of the best assets Ontario has to-day, and that fire would certainly have caused the loss of millions of feet of timber had it not been checked and confined to a small space, and I think the ranges deserve credit. I hear the government are going to increase the staff, and I think it desirable that they should do so.

The meeting adjourned at six p.m. till ten a.m. Friday.

FRIDAY, March 7th, 1902.

The Association met at ten a.m.

Mr. HIRAM ROBINSON, Chairman—I would ask Mr. Dowling, who has furnished the map of the west that is now before us, to explain it.

Mr. DOWLING—The map is drawn to a scale of twelve and a half miles to the inch, the same as the Dominion Lands map. The hills are drawn to a scale of about two thousand feet to the inch. That is, they are built to scale, though the scale is very much exaggerated—about twenty times. Of course in a prairie country you would show no hills at all if they were not exaggerated. The yellow is the prairie and there is a drabbish gray which is partly wooded country, and the true forest is coloured dark green. I do not think there is anything more to be said—the model speaks for itself.

Professor JOHN MACOUN—The title of this paper is not mine, but I adopted it, as you will see when I wind up. My idea in writing a paper at all was, to write a short paper that would be published in *Rod and Gun*, and not read before the Society. It was thought better to break the tedium of your more scientific papers, bearing on one subject all the time, by introducing something that was not exactly in the line altogether of forestry.

THE SECOND DISCOVERY OF THE WEST.

Professor JOHN MACOUN, *Assistant Director of the Geological Survey.*

Prior to 1857, the Hudson Bay Company had everything in their own hands and the Red River country or Hudson Bay Territory was an unknown land. In that year the Imperial government sent out an expedition under Captain Palliser to examine the country. His chief assistants, D. Hector and Mr. Bourgeau, gave us our first knowledge of the geology and natural history of the country.

In the same year the legislature of Canada fitted out an expedition and placed it under the command of S. J. Dawson, C.E., who is still with us, though almost forgotten, and Professor Henry Y. Hinde. During the succeeding two years these gentlemen examined the country between Lake Superior and the Saskatchewan. Their report, which was published in 1859, attracted much attention and a number of Canadians were induced to settle in the country. Among others who went there at this time was Dr. Schultz, then a student at Queen's College, Kingston. While crossing the plains from Crow Wing to Pembina he made a collection of plants which attracted my attention and led me to study the geographical distribution of plants in this region. The result of this study showed me that the summer climate of the Red River country was suitable for the growth of cereals. In after years I had the opportunity of proving this.

During the next few years Canadians kept coming into the country, and Dr. Schultz and his friends kept up an unceasing warfare against the claims of the Hudson Bay Company, and in the year 1868 so far succeeded that the settlement of Portage la Prairie was formed and a government was established outside of the control of the Hudson Bay Company.

Late in the autumn of this year the Canadian government sent out engineers and surveyors to commence the construction of the road between the Red River settlement

and the Lake of the Woods—the western end of the Dawson route. It was now plain that the end was approaching, and on October 16, 1868, the commissioners sailed for England to try to acquire the Hudson Bay territory, and on March 9, 1869, the negotiations terminated and Canada acquired the whole territory for (£300,000) $1,500,000.

Early in 1869, an Act was passed by the Dominion parliament, providing a territorial government for the country to be acquired from the Hudson Bay Company. A number of surveyors were sent up from Ottawa and the survey of the country commenced, and with the surveys conflicting reports as to the value of the country.

Thirty years since the greater part of Assiniboia and Alberta were condemned to perpetual sterility and the 'fertile belt' along the Saskatchewan was the only tract considered fit for settlement. As late as 1870, Archbishop Taché wrote that the Great American Desert extended as far north as latitude 52° and as far east as 100° west longitude. On page ten of his 'Sketch of the North-west of America,' he writes thus of 'The Desert':—

> This word will not surprise those who have studied the western part of North America. Everybody has heard of the Great American Desert, but all may not know that it extends into British possessions, passing the boundary at 100° W. Long. and Lat. 49° N., then following a line more or less winding in a general northwesterly direction, passes still further to the north and bends again to the north-west at 113° W. Long. and 52° N. Lat.; thus forming an area of at least 60,000 square miles. Here is a desert, an immense desert. It is certainly not everywhere a plain of moving sand, and quite dried up; but it is quite vain to think of forming considerable settlements on it.

Farther on in the same work he speaks of 60,000 square miles of prairie, and still north of that forest lands of great fertility, but owing to frosts and many enumerated drawbacks, he considered permanent settlement by numerous colonists as impossible. He speaks of amateur farmers and summer tourists as being liable to mislead the public by their optimistic views.

Two years after this work was published the writer traversed the 'fertile belt' in company with Sir Sanford Fleming and Principal Grant, and two years later, in 1874, his report was printed in the Railway Report for that year. In that report the writer was emphatic in regard to the value of the country for agricultural purposes. None of our public men had yet realized the value of the country, and the 'fertile belt' was the only part considered fertile, but was under the ban of 'deadly cold and fierce summer heat interspersed with summer frosts which were to destroy what the hail, winds and rains of the growing season had left.'

During the next five years the battle raged, and still the desert remained in the south and the summer frosts in the north, and politicians talked truth and falsehood as it suited their party. All this time surveys for the Canadian Railway were in progress with the intention of carrying that railway through the Yellow Head Pass. Unfortunately here, too, there were two factions—one wishing to carry the railway through the Yellow Head Pass, the other section through the Peace River Pass. These surveys carried the line through an elevated region—indeed along a height of land—and hence summer frosts were prevalent, and the summer frost idea became fixed in the minds of the public.

In 1875 an expedition was sent out by the government under Dr. Selwyn to examine the Peace River region. The writer was chosen to accompany this expedition as botanist, and on his return was required to report on the country traversed. On this expedition he examined the Peace river almost from its source to where it enters Slave river, and brought back barley and wheat in the ear, which caused great excitement in Winnipeg, and aroused the enthusiasm of Canon O'Meara, Professor Bryce, Mr. Taylor, the United States Consul at Winnipeg, and many others. The summer of 1875 had been disastrous to Manitoba, as that season a summer frost came early in August and killed the potatoes, and the grasshoppers had eaten up all the wheat. There was literally no crop of anything, and my news from the north was a light out of darkness. That winter Mr. Mackenzie, who was then premier, lent a large sum of money to the Manitoba farmers to buy seed wheat for the spring of 1876. This wheat was hauled on sleighs from St. Cloud, in Minnesota, or from a point farther south, and from this seed sprung the famous 'red fife' of the millers of to-day. The introduction of this wheat changed the whole aspect of affairs in Manitoba.

In 1878, Consul Taylor reported to St. Paul the wonderful results of a change of seed, and the next year some of the St. Paul men came up to Winnipeg to see this wonderful hard wheat produced there. It may be mentioned that in the spring of 1879 railway communication was opened between Winnipeg and Moore Head, in Minnesota. The news carried to St. Paul woke up some of the leading men there, amongst others James Hill, the present railway magnate. Railway deals of great importance took place about this time, and the foundations of the great wealth of Lords Strathcona and Mount Stephen were laid. All these changes seem to have come from the visitation of the locusts in 1875 and the introduction of new seed wheat in 1876.

In the autumn of 1878 there was a change of government, and the following spring Sir Charles Tupper, who was Minister of Railways, instructed Sir Sandford Fleming to have an examination made of all the country between the 100th meridian and the Rocky Mountains and southward to the Great American Desert, which was still supposed to exist. Nine parties were formed, and the writer was given charge of the most southern one, with instructions to cross the 'desert' south of latitude 52°. It is not necessary to describe that journey and its revelations in this summary, but it may be mentioned that coal was found and burnt at the Black Foot Crossing and some brought to Ottawa and placed in the Department of Agriculture. On the writer's return to Winnipeg he was invited to lecture in the City Hall, and a vast audience of bright-looking, intelligent men greeted him with their sympathy and rapt attention.

It was a revelation to them to learn that in the valley of the Qu'Appelle alone there were 8,000,000 acres of good land without a break and up to this time unknown. As he spoke of the unending expanses of waving grass and prairie flowers and showed them that the desert had disappeared, and in its stead were farms for the taking, the hall rang with cheers, and the speaker felt that his mission was fulfilled and at last light had been thrown on receptive soil, and for all time the question of grain raising in the Canadian North-west was settled.

The summer of 1879 was an eventful one. The whole northern district was explored. Dr. G. M. Dawson confirmed the writer's glowing account of the Peace River region. The writer had shown there was no desert north of latitude 51°, he had penetrated into the Bow River Pass and had seen the open valley west of the gap, and he had discovered coal in a number of localities. At Ottawa such uncertainty still existed about the value of the prairie region that during that summer a map showing Bishop Taché's 60,000 square miles of desert was actually struck off, but the writer's Winnipeg speech and his verbal report to Col. Dennis prevented its distribution and it was never issued. As a matter of fact, many houses built in Ottawa in 1880 were lined with these maps.

Both parties in the House of Commons were now awake to the value of the country, and the writer became a centre from which information regarding the value of the North-west was constantly flowing. During the winter of 1879–80 he lectured in the towns and cities of Ontario and the awakened people drank in his words, and in the spring of 1880 the great rush began.

As the writer had shown that the region north of 51° latitude was not desert, he was commissioned in the spring of 1880 to make further explorations, but this time he was furnished with a map and a blue line traced upon it which ran through all the supposed deserts and sand plains. It is scarcely conceivable that that blue line started one mile east of Brandon, and the district from the Brandon Hills west of Oak Lake was included in it. That season 1,800 miles were travelled over by carts, and a pit dug to the subsoil every half mile. This season's work settled the desert question for ever, and I was able in October to telegraph from Humboldt—after I had faithfully carried out my instructions—that there was no desert, and that nearly all the land examined had a fertile soil and, at the worst, was excellent pasture land.

Early in this year the syndicate for the building of the Canadian Pacific Railway was formed and surveys were pushed with the intention of taking the railway through the Yellow Head Pass. It was an easy matter from Brandon westward to Moose Jaw, but here the engineers who were surveying the line diverged to the north, and when they reached the Saskatchewan met the escarpment and were forced to the unsafe river cliffs. As spring approached it was decided that the writer should explore the forest country to the north of Duck Mountain. Early in March the Marquis of Lorne, then Governor

General, invited the writer to lecture before him in Ottawa, and announced his intention of making a tour through the great lone land the next summer.

When the spring of 1881 came, the excitement regarding the hard wheat of Manitoba had taken possession of many people, and the American government remitted the duty on Manitoba wheat when exported to St. Paul, as it was proved that by mixing it with the softer wheat of Minnesota a better grade of flour could be produced. As far as I am aware, this permission is still in force.

Major Roger's report of the discovery of Roger's Pass and the writer's reports of the country west of Moose Jaw settled the southern route for the railway, and from that time forward it was pushed with energy.

Scrub Oak (Quercus macrocarpa) grown near Nelson, Man. Showing size these trees attain in Southern Manitoba on good soil.

Since 1881 the development of the North-west has been largely in the hands of the Canadian Pacific Railway and no matter what others may think, the writer believes that their policy has been an enlightened one. It is ancient history to speak of their attempts to establish farms in the desert, in the irreclaimable wilderness, their successes and their failures, but this much is certain that they taught men like myself that climatic conditions prevailed in the region west of Moose Jaw that could be easily overcome, and that when the time came all the desert would be brought into subjection to man.

About 1887, Superintendent Niblock made the experiment of planting trees and making a garden at Medicine Hat and by a liberal supply of water showed that only that was needed to ensure success. In 1890 the writer saw two apples on a tree in this garden. He had settled two questions, the growth of trees and apples in the desert. In 1891 Mr. Pearce showed him over his grounds at Calgary and told him what he purposed doing. He prophesied success because only two things were necessary, shelter and water. Mr. Pearce's work is an object lesson.

At Moose Jaw one of the C.P.R. officials planted out over an acre of trees in 1895 and many wise men shook their heads at the venture. He gave the trees water and success followed. These few instances will be sufficient for my purpose.

After I settled the question of grain raising the other battle had to be fought, I mean the growing of trees. As early as 1879 I saw what made the desert and how it could be overcome yet no man would pay attention. The so-called mountains and hills that contained wood were part water and part wood and hence fire could not destroy it altogether. Turtle Mountain, Brandon Hills, Moose Mountain and Wood Mountain were all examples where timber was left, while the country to the north was level and without wood. No thinking person could fail to see that fire caused the prairie.

In the autumn of 1891 I was asked to lecture at Indian Head on my way east from Banff. As soon as I began to speak I told the audience that the man who built the dam over the brook in the village deserved a monument in bronze, for he had solved the re-foresting of the plains.

The future of the prairies is bound up with the conservation of the waters and the whole surplus rainfall between Brandon and the mountains is allowed to run off or be evaporated with scarcely an attempt being made to save it or put it to any use. To-day there is enough water going to waste around the Cypress Hills to irrigate perhaps a million acres and no attempt is made to save it. Some day a syndicate will get a concession of these waters after a successful lobby and ever after fatten on the country.

The conservation of the waters means the re-foresting of the country, the amelioration of the climate, the establishment of towns and villages and a vast increase in population and wealth.

Only six years ago I saw the engineers making a survey for the irrigation canal from St. Mary's river to Lethbridge. Now the canal is an accomplished fact and settlers are pouring into southern Alberta. The engineers told me not long since that the treeless plain south of Lethbridge was already feeling new life and the canal would be bordered with trees in a short time.

It is not for me to tell how the re-foresting should be done, but I do feel that I have a right to say that there is no experiment about the matter. Trees native to the plains will grow anywhere in the prairie country except where there is alkali in quantity and all they need is water. After they are established the more tender kinds can be planted under their shelter and later still many varieties of hardy apples will be brought to perfection.

Some years ago I said that grapes would yet be grown at Medicine Hat. I say the same still. Intelligent men outside of government officials, and government officials are now at work, and a very few years will pass before the raising of fruit and the growing of trees will be as well understood as the raising of grain, and people will wonder how they failed to appreciate the self evident fact.

The growth of one apple at Medicine Hat in 1891 showed me the climate was not to blame for failure. Manitoba has got so far as an apple exhibition, crab apples have been grown at Edmonton and yet these points are 900 miles apart.

When I first advocated the claims of the North-west, I had no data to support my assertions other than that I deduced from plant growth. Now it is far otherwise.

A multitude of settlers have settled the grain question, and Mr. Stupart in a late paper has shown that climatically northern Alberta equals northeastern Ontario in the late winter and spring months. In this paper he shows that with the exception of south and south-western Ontario in no portion of the country does the spring open as early as in Alberta.

Winnipeg is at about the coldest point in Manitoba and the territories, and here the cultivation of fruit is a success. Ottawa is colder than Edmonton but has a warmer summer, yet here we raise apples with success though there are many in this city that believed otherwise 25 years ago.

Hear Mr. Stupart's own words on the question of temperature.

The mean temperature of northeastern Ontario deduced from observation at Lindsay, Ottawa and Rockliffe gave a March mean of 20·7 with a mean maximum of 31·1 and an April mean of 38·2 with a mean maximum of 49° showing that during March and April the weather is colder in northeastern Ontario that in Alberta.

At Edmonton March has a mean temperature 23·7 with a maximum of 35·3. For April, Edmonton and Calgary a normal of 39·3 with an average maximum of 51·5.

March,	Ottawa 20° 7'	max.	31° 1'
"	Edmonton 23° 7	"	35° 3
"	Calgary 26° 8	"	39° 2
April,	Ottawa 38° 2	"	49° 0
"	Edmonton 39° 3	"	51° 5
"	Calgary 39° 3	"	52° 5

In conclusion is it unfair to ask my audience to agree with me, that in the near future the 900 miles will be dotted with orchards, as it is fast becoming dotted with grain fields.

I might say a generation ago the man who said that the country west of Manitoba was fit for settlement was considered to be subsidized by the government. I was accused by Conservatives of being subsidized by Mr. Mackenzie to make false statements, and I have been accused by Liberals of being paid by Sir Charles Tupper for the same purpose, and I am sorry to say I got money in neither case. The country in the neighbourhood of Brandon was condemned to sterility as late as 1870, and up to latitude fifty-two was regarded as unfit for settlement.

The whole of the land in the North-west was made prairie by fire, with the exception of a few square miles. There is wood at Turtle Mountain, Moose Mountain, Wood Mountain, Cypress Hills, West Butte and Three Buttes. These hills are not high, but they are more or less covered with wood, and when you examine them you find the country is undulating, with ponds and lakes in the hollows. These ponds prevented the destruction of the timber, but when the fires got away from the hills on to the level land they could not be stopped. The fire burnt on and left a margin of burnt timber and grass, and next year the fires started afresh, and the result was when the fires were stopped two hundred miles north of the Saskatchewan, there was a margin of burnt trees always to the south, and outside of that margin a margin of young trees growing up out of the grass, and still further you would find little poplars of a year old which had sprouted from the roots of the dead ones, so that it is evident the whole of that country was covered with forests at one time, but through the agency of fires it became a prairie. What is to hinder it from being covered with timber again? What is needed is water. I make that statement—it may be contradicted, but in later years, after I am dead, it will be proved. The land is there, and all that is required is water to make it grow anything. The climate of the North-west is good and the soil is good. The climate at Edmonton in March and April is warmer than the climate at Ottawa. Spring commences earlier in Edmonton than at Ottawa, and spring commences earlier even at latitude 56°, in the Peace River country, than at Ottawa; yet we hear the remark often made of people who are going into that country, what fools they are to go into that frozen region.

Mr. JABEL ROBINSON, M.P.—Have you ever visited the Old Wives' Lake country?

Professor MACOUN—I discovered the Old Wives' Lake in the year 1880, when I was fifty miles away from it by mirage. We marked it down by compass and went and found it.

Mr. JABEL ROBINSON—Nineteen years ago this spring I was at Old Wives' Lake, and I regarded that country as you do. I believed if it was irrigated it would become a vast garden.

Professor MACOUN—You are quite right from my standpoint.

The CHAIRMAN—We must all acknowledge the great work that Professor Macoun has done for the Dominion of Canada. The subject is now open for discussion.

Mr. FLETCHER—Professor Macoun made one statement—that the whole future of the North-west is wrapped up in that question of moisture. That is the case, as I will

SUPERINTENDENT'S RESIDENCE, INDIAN HEAD. (BEFORE PLANTING.)

bring evidence to show later. The next question is whether the prairies of the North-west were at one time covered with trees or not. That is a vital question, because if they were at one time covered with forest there is no reason why trees should not grow there now. He is right in his opinion, that the reason why they were denuded of trees was largely because of fires which, from time immemorial, have swept over those prairies, and the evidence found on those mountains he has mentioned is that there are trees, large trees, on top of them. On Moose Mountain there are poplars bigger than my body, and the same on these other ranges of hills. Another thing that Professor Macoun did not mention is that wherever you find a river or bend of a river, where that river protects trees from the sweep of fires, there are to-day big trees found, right across the prairies. The question of the conservation of moisture has been proved to be the one point necessary in the opening up of thousands of miles of country in the North-west by the one system of summer fallowing. By that means the moisture is held in the land, and where that is done wheat and other crops can be grown. That is a new thing. Fifteen years ago, at Moose Jaw, I found men who were leaving the country under the impression that it was too far west for wheat-growing. Now that country is opened up, and this year land, which was formerly considered worthless, has been selling at higher prices than in any other part of the North-west. That change has been brought about by summer fallowing. The system was introduced by Angus MacKay, the superintendent at Indian Head. If he had never done anything else but that, he has done a great deal to open up that country. Trees can be grown in that region on one condition, and that is that the moisture is held there, and the only way to hold the moisture is to cultivate, as I have mentioned. Wherever trees have been grown with success—and we have at Indian Head groves miles long, forty or fifty miles—every one of those trees has been saved and its growth made possible simply by cultivating between the rows. We all know what cultivation is. The Hon. Sir Henri Joly will grow his trees at Victoria with perfect ease without water if he will run his cultivator between the rows. Wherever trees have been successfully grown in the North-west it has been by using the cultivator. Where trees have been sent out to the North-west and cultivated they are alive to-day; where they have been set out and not cultivated they are almost invariably dead. Let us, as foresters, recognize this principle, that we all know the fact, but do not let us take it for granted that all others know it—the solution of growing trees in the North-west rests on the conservation of moisture, as Professor Macoun says. I am confident that the summer fallowing of land will hold the moisture as soon as it comes there, and that cultivating the soil will keep it there afterwards, and that this will solve the question of growing trees in that part of Canada. Every one in the North-west is interested in growing trees. Every farmer will grow them if possible, and will go to great trouble and expense to make a success of it. Trees are being grown there by every one who can get them and who wants to improve his place. They are paying a great deal of attention to the matter. The spirit of forestry seems to have got through the whole country up there. Fifteen years ago, crossing the prairies, if you saw a clump of trees in the distance it was an event. Now you can hardly find a house without a wind-break, and all recognize how they beautify a place. Professor Fernow, in his lecture last night, exhibited a number of pictures, and, speaking of the encroachment of the woodland on the prairie, there was one very instructive picture showing an island of trees, which proves exactly what Professor Macoun has stated. Any one who has been in the Duck Lake country must have observed that the whole of that country is now becoming covered with trees in islands. The aspen poplar is gradually spreading over the

whole of that country, and islands have grown up covering perhaps fifty to a hundred feet, wherever there is moisture—little circular islands, and there are thousands of these, and they are increasing every year, because where one aspen begins it spreads from that point, for there are now no fires and no buffaloes. The buffaloes have been almost as destructive, I think, in the past as the fires have been. Hundreds of thousands of these large animals fed very largely, not only on grass, but on any shrubbery that there was and broke it down, and prevented the leaves falling and forming humus. The trees were not given a chance to grow, and it must have had a very important effect on the results. The buffalo has disappeared and there are no more prairie fires. Where, years ago, it was a question of getting out of the way of the fires while crossing the plains, you hardly see one now, except as the result of gross negligence. Every one is so much interested there that they are putting them out, and you see clumps of trees as often as you see farms. During the last fifteen years the development of that country has been so rapid, that you can hardly get out of sight of trees, because the farmers understand the conservation of moisture and there is a marvellous growth. I hold that the question of the conservation of moisture, which Professor Macoun has brought forward—and that is the whole pith of his paper—is what is needed. If the moisture is conserved, trees will grow there if you give them shelter. Professor Macoun's papers are always original and interesting from beginning to end, but there is a solid kernel in this; and it is what all are interested in knowing, that the operation which consists of turning in a plough and breaking the soil and running a harrow on it means the success of forestry in the North-west. I claim you will never be able to grow a row of trees in the North-west unless you use a cultivator. I would not have spoken so long, but I know that that is the all-important question.

Mr. DRUMMOND—I have had some practical experience in the North-west in these matters in connection with colonization and immigration there, and I can bear out very largely a good deal of what Professor Macoun and Dr. Fletcher have said, as to the importance of the conservation of moisture, and of the other fact that trees will grow upon the prairies. Trees have been there. Going along the prairies, I have kicked against stumps in the grass, showing that what appeared on the face of it to be actual prairie had been at one time covered with forest. Unfortunately, the extent of forest is not very large in what we call the strictly prairie region. There are clumps here and there and with the progress of settlement the denudation of the clumps has been going on rapidly. The settlers have been cutting them for fuel so rapidly that we hardly know what to do. The settlers must have wood for fuel, and yet the destruction of the trees will have a bad effect on the future of that region. Where you have a clump of wood, one of the most effectual ways to increase it is to start from it as a centre and let the woods spread in the natural way. In regard to moisture in the land, I think Dr. Fletcher has put the matter in a nut-shell, and if we can get the settlers to carry out this idea we will solve a very important question. Irrigation should go along with forestry. I noticed that the journal published at Washington by the Forestry Association there is now called 'Forestry and Irrigation,' and very properly. We have a large field in the North-west where irrigation takes place, where we can solve these questions, and they are being solved there, but in the other portions of the country, I do not see so clearly how the best results can be attained except by the method which Dr. Fletcher has mentioned. The country is flat, and vast quantities of water flow down between high banks, for instance, in the Qu'Appelle, which could be preserved. The River

Qu'Appelle for two or three hundred miles flows through a deep valley, thirty or forty to seventy-five feet deep, and in some places a mile wide. All that forms a conduit down which the water flows and goes to waste. We may find some means of conserving that, but you must remember the prairie is level, and you have to use perhaps the operation of pumping, and that adds expense which farmers may not be able to bear. The whole question, I think, is one that is capable of solution, but what we really want is the dissemination of information there among the farmers who are the practical men who must carry it out. The experimental farms are doing splendid work, but I am not so sanguine as Professor Macoun is. Possibly the question of shelter in addition to moisture will be the solution of that. When we get the farm sheltered from the wind we can grow fruit trees between the rows. Perhaps Dr. Saunders may throw some more light on that, but that is my conviction at the present time.

Dr. SAUNDERS—There is no doubt that last autumn the Manitoba Horticultural Society showed at one of their exhibitions at Winnipeg, quite a number of samples of very nice fruit which were grown in Manitoba. These samples of fruit were mainly grown by one grower in Nelson, near Morden—Mr. Stevenson. The trees on which the fruit was grown were sent in 1892 from the experimental farm. Mr. Stevenson has an exceptional farm for shelter. There is a large area of wood to the north and west of him, and he has succeeded in growing Scotch pine, which he has planted in single or double rows along the orchard, and the trees are between the pine rows. You do not see the trees until you go among the pines, and then you see them bearing fruit, with the pines towering up on either side of them. Those conditions are remarkably favourable, and he succeeds in a way that no one else has succeeded. His altitude is about eight hundred feet above the level of the ocean; the altitude of Winnipeg is about seven hundred feet, so that is more favourable than Indian Head, where you have an altitude of two thousand feet, and an absence of all shelter. While Mr. Stevenson has achieved success, and there are other farms which can be brought into the same condition, the growing of fruit by the general farmer under ordinary conditions is still an unsolved problem. We are doing something to solve that problem at the experimental farms. Indian Head, at the time the farm was selected, was an open prairie with not a single stick or shrub in sight as far as the eye could reach. I have here photographs of the farm, one showing the house of the superintendent at Indian Head, surrounded by trees and shrubs. These views of the farm only reached me a few days ago. They show the progress of tree-planting on that farm. We have not yet, notwithstanding we have tested the same varieties of apples which were sent to Mr. Stevenson, succeeded in growing fruit. We sent the same varieties in much larger numbers to Brandon and Indian Head, and have not yet succeeded in growing them there. Year after year the trees have been killed to the snow line, and we have not made much progress, but with the new cross-bred fruits which have been brought from northern Siberia, *Pyrus baccata*, a crab-apple that comes from the neighbourhood of Lake Baikal, we have succeeded in raising nine varieties which will compare very favourably with our own crabs, such as the Transcendent and Montreal Beauty, and will, when grown by the settlers generally, be of the greatest value to them, giving them a reasonably useful supply of this very important fruit.

Mr. DRUMMOND—Is that done by grafting?

Dr. SAUNDERS—By cross-fertilizing.

Mr. DRUMMOND—Have you not tried grafting in the North-west?

Dr. SAUNDERS—We have, but none of the trees have yet borne fruit.

Mr. GEORGE JOHNSON—What do you graft with?

Dr. SAUNDERS—A tree that grows far north in Russia. Our seed comes from Lake Baikal. These trees have been tested now for about nine years at Indian Head and Brandon, and we have not at any season during that time had any of the terminal buds of these trees killed. Then, by cross-fertilizing these we have, I believe, retained their hardiness almost entirely, and increased the size of the fruit. With such trees as that, which any farmer can plant out, and which grow either with shelter or without shelter, success is likely to be attained. They do better with shelter no doubt, but they can be grown on the open plain, and at an altitude of two or three thousand feet, as well as at Winnipeg. With such material as that, I hope it will not be long before the question of growing fruit in the North-west will be solved—not such fruits as we grow here; it will never be a fruit country where apples will be produced for shipment to other countries, but they will be able to grow a sufficient quantity of useful fruits to supply their own families. One word with regard to what Professor Macoun and Dr. Fletcher have so well put, with regard to the conservation of moisture and the protection needed to enable trees to be grown spontaneously—if you may call it spontaneously—on the prairie. At the time we selected the Indian Head farm there was not a tree or shrub anywhere in sight. The district at that time was overrun by fires almost every year: but since the country has become more settled, and with the example and experience of the experimental farms before them, the people have protected their farms from fires, and now, no matter where you stand on that plain, on lands which have not been broken, you see little clumps of poplars and willows growing up some ten or fifteen feet high, coming up almost everywhere, where there are hollows in the ground, and where there is an unusual supply of moisture. They need moisture, and will grow without cultivation in those hollows. On the uncultivated plain, you cannot get out of sight of those little clumps of trees which have sprung up in that way.

Mr. MACOUN—On the question of the conservation of moisture, is it necessary to conserve the moisture for the use of trees after they get established? I was at Brandon a few days ago, and up behind the town there and had occasion to go down into a man's cellar. He had a lot of box elder which had been growing for fifteen or sixteen years, and the roots of those trees are down seven to nine feet in the ground, and it seems to me, that after a few years, in Manitoba at least, after the trees get established they will look after themselves when the roots get down to the moisture. It is a question I should like to have answered by those who have had experience out there. With regard to apple trees in Manitoba, I believe they will succeed better in sod after two or three years than if cultivated, for the reason they make four to five feet in growth—I have seen even six feet of growth in apple trees. The wood may not ripen as well as if there was only one or two feet of growth. It seems to me if they were left in sod they would ripen much better and come through the winter better. Apple trees do best on northern slopes. When planted on southern slopes they bud earlier in the spring, and are more likely to be affected by spring frosts, but when grown on a northern slope they will be kept back and escape to a large extent the spring frosts. What I should like to know is, whether in the dry districts it will be necessary to cultivate and irrigate forest trees

after they get established—that is, after the roots get down a couple of feet in the ground.

The CHAIRMAN—I might be permitted to call on Professor Fernow for a few remarks, and perhaps he might be willing to give us his opinion.

Professor FERNOW—It is dangerous to call on me to speak on this subject, because it happens to be my fad, this question of the conservation of moisture. It also opens up a sore spot, for I once was put in charge of experiments to produce moisture by artificial rainfall. The United States government appropriated a certain amount of money, which I was to expend in making rain fall, and I suppose that was the punishment for starting the fad of water conservation. I believe in water conservation, not only in dry but in wet districts. If our farmers understood the water question, they would be more successful. They should understand how to have the water at the right time and for the right purposes. I am also glad to be borne out in the proposition I made last year, that the inhabitable earth is a potential forest. Nevertheless, I do believe, that man can always do better than nature. Perhaps it is not a proper position to take, but so long as we have wheat, oats, rye, barley, apples, &c., which nature did not produce unaided, we should learn that lesson, that it is always an improvement on nature. We cannot do without nature's forces, but we can improve on the manner in which they are exerted, and so I do believe that tree planting can be much better performed than nature unaided can do it. However, I have become cautious as regards generalizations, and when it comes to the necessity of cultivating trees or any other crops, there are different conditions which we should never forget. I was only this morning telling my good friend, Dr. Saunders, whom I revere for the faith he has shown in what can be done in those regions by advertising ourselves, by talking—I told him about an experience I had in Arizona which will answer the question of the gentleman across the room regarding the necessity of cultivation, and also cite an experiment of mine in Nebraska.

This experience in Arizona was as follows: I was travelling through the so-called Painted Desert. I was sitting in camp one night, and digging in the sand—it is a real sandy desert—and I spoke to my companion and said: 'This desert, I am sure, can be made to bloom, for here, within six inches feel the sand and it is moist.' This is the very same spot I showed you last night, when I told you that only once in two years there was a rainfall: I think I exaggerated, it is once in eighteen months. I went on the next day in the middle of that desert, I was travelling with a companion we had picked up, and, having had experiences with mirages, having seen any number of lakes that did not exist, I said, 'If I had not seen mirages before, I would say, there is a cornfield—a real actual Indian corn field' 'Yes', he smiled, 'We will drive that way and see whether it is there: that is where my home is.' To my utter astonishment the desert was already blooming, because he had sugar cane, corn, potatoes, peas and various other things growing on that very sand without irrigation, and, as he told me afterwards, foolishly having cultivated—I say 'foolishly' advisedly, because under the conditions prevailing there, it is not desirable, it was not necessary, it was a damage. Further on I found the Indians were growing their corn there without irrigation or cultivation. It so happens that that sand—this is my explanation—has a structure which will keep the moisture, while the sun dries the surface and forms a cover and prevents evaporation. So it is not always cultivation that will do it. You have to take into consideration the character of your soil.

I had this experiment in Nebraska: I proposed to grow trees on the sand-hills of Nebraska which were not fit for anything else, that are being ruined by being pastured because the cattle stir up the soil and destroy all vegetation and the winds shift it and it becomes useless. In 1901, I started a little experiment showing that trees could be grown there, pines especially, and the way to grow them is not to cultivate, as the prairie farmer usually does. We had, of course, a plot which we cultivated in order to have a comparison, and one plot which we simply planted close. That experiment, now ten years old, is to my great satisfaction, a favourite spot for local forestry associations to visit. They go hundreds of miles by train, and I think eighteen miles through the country to see that little clump of two acres—it was not even two acres—half an acre I think—to see these pines growing, an uncultivated forest, because all we did was to stick in the trees and let them take care of themselves. A movement now is on foot to get five hundred thousand acres of government land set aside for tree planting in Nebraska.

Dr. FLETCHER—We have no sandy district such as you refer to in this country.

Professor FERNOW—After a few years, the trees will have sent their roots down to the moisture. That is what every one has to look for. The first three or four years, before the root system is established, are the dangerous ones; after that the trees will easily sustain themselves, so there is no difficulty at all about the cultivating after a few years.

Mr. MACOUN—That is what I wished to make clear, because it might go to the farmers of the North-west that they must keep cultivating all their lives.

Professor FERNOW—After the roots extend downwards it is better without cultivation. As soon as the tree is established the soil is not compacted any more and thereby the evaporation is reduced.

Mr. MACOUN—That is the point I wished to make clear, because it is very important.

Dr. SAUNDERS—We have demonstrated that in the Indian Head district there are large areas where they do not need any cultivation after four or five years at the utmost. They have covered the ground sufficiently.

Professor FERNOW—I did not know what the paper was driving at, because I was not here at the beginning. I am commencing to see that this country is very large, that the problems are infinite, and one of the difficulties is to choose the problem which is the most important. When I saw this man in the Painted Desert raising his corn, the question came 'why don't you go to a part of the world where you do not need to fear, where success is sure?' and so I have come to think there is so much more to be done nearer home that I have given up the great interest I at first had in making the desert bloom.

The CHAIRMAN—The next paper is by Dr. Saunders, Director of the Experimental Farm. I have no need to introduce him, he is well known not only here but throughout the world.

THE WORK AND INFLUENCE OF THE EXPERIMENTAL FARMS IN PROMOTING TREE PLANTING IN THE CANADIAN NORTH-WEST.

Wm. Saunders, L.L.D., Director of Experimental Farms.

The Experimental Farms of the Dominion of Canada were established in 1887. Up to that time practically nothing had been done in a public way to encourage the planting of trees about farmers' homes in this country. In the eastern provinces of the Dominion trees were still looked upon as man's enemies, and it was regarded as a sort of duty on the part of the settler to devote his energies to their subjugation, and so mercilessly was the war of extermination carried on that in many instances no trace of trees other than their stumps was left anywhere near the dwelling of the farmer, who seemed to rejoice in the bare surroundings as evidence of his complete victory over the enemy against which he had so long and so persistently contended.

Then there were very few farmers in the east who took any interest in tree planting or in any measures looking to the preservation of our timbered lands, and the general public shared in this indifference. None of the wise and enlightened measures in connection with the preservation and proper management of our woodlands which have since agitated the minds of the more thoughtful people in this country had at that time received any attention.

While there are enormous areas of very fertile land awaiting occupation by the settler in different parts of the Dominion, there are also large districts which are unfit for agricultural settlement, but which, if held by the country as timbered lands, may be made to yield large and constant revenues. The rational and common sense view that the country should endeavour to make the best use of the heritage it possesses in its landed property, by directing the settlement of its best agricultural holdings where success in farming is easy, and retaining the poorer classes of land for timber growing, has not until recent years taken possession of the public mind. The wholesale destruction of forest properties by a lack of management and by destructive fires has aroused public attention, and the wisdom of a better policy has become so apparent that the tide of public sentiment has set strongly in its favour. Hence, governments now have the backing of a large majority of intelligent people in every movement they make towards a rational policy in the treatment of this important part of the country's wealth, which may with proper handling be made to yield a large annual income.

While there has been a great plethora of tree growth in the East, the great plains of Manitoba and the North-west Territories have, to a large extent, been bare and wind swept. The early settlers who built their dwellings on the treeless prairies, longed for the shelter and shade which trees are so well fitted to give, and seeing no reason why the beautiful trees of the East should not thrive equally well in the West, many of them willingly devoted a portion of their hard earnings to experiments in tree planting. Many thousands of dollars were thus spent annually in bringing from Ontario forest, ornamental and fruit trees which were unsuited to the climate, and which, planted one season, were usually dead by the following spring. The constant and bitter disappointments following these efforts were so discouraging that many were led to believe that trees could not be grown in those parts of the country, and that all such experiments in tree planting there were useless.

A few of the settlers had followed the more rational course of looking about them and of selecting some of the best of the native trees found in the ravines and river bottoms in different parts of the country, and transplanted these to suitable positions on their farms, or had raised young trees from the seeds of native sorts to form a shelter about their homes. At the time of my first visit to the Canadian North-west, in 1887, I found groups and clumps of young trees of box elder (*Acer negundo*) planted about the homes of the more thrifty settlers, particularly in the neighbourhood of Portage la Prairie. The success of these efforts soon became generally known and a strong desire was manifest to obtain young native trees and tree seeds for planting. The settlers

desired these objects of beauty about them to relieve the monotony of the landscape, to give shelter to their dwellings, their stock and their gardens, and to make their surroundings more homelike.

When sites for the western experimental farms were chosen, in 1887, one of them was selected on the open prairie, where neither tree nor shrub could be seen as far as the eye could reach. This choice was made so that a practical demonstration might be afforded as to the possibility of providing shelter under unfavourable conditions, and that an example might be given as to how satisfactory shelter could be furnished in the quickest and most economical manner. The need for shelter is greatly felt in the prairie regions, and the efforts which have been made in aid of tree growing in that country have been greatly appreciated by the people.

On the prairie farm at Indian Head a shelter belt has been planted, 100 feet wide, along the west and north boundaries, extending for nearly two miles. Blocks of trees have been put out of from two to five acres each, the trees having been placed in all these instances at four or five feet apart each way. All the roads on the farm are margined by avenues of trees or tree hedges. Many hedge inclosures have been planted, taking in blocks of from half an acre to an acre each, forming protected areas in which garden vegetables and small fruits can be grown much more satisfactorily than in the open. These inclosures are also used for testing the larger fruits under trial, particularly the many sorts of crab apples and plums. They are also utilized for the growing of flowering bulbs and perennial flowers and for testing new and untried varities of trees and shrubs to determine their usefulness in that climate. In all, there are now on this farm about 130,000 trees growing, and visitors wandering through the different plantations where many of the trees have now reached a height of from 25 to 30 feet are liable to forget that they are still on the prairie.

The influence of the larger plantations on the crops of grain growing in their vicinity is very marked in protecting them from destructive winds, which at times blow the soil to such an extent as to lay bare the roots of the young plants and cause them to wither and perish. In 1900, we had a season when wind storms were exceptionally frequent and severe in the Indian Head district. The yield of spring wheat on plots partly protected by tree growth was over 30 bushels per acre, while unprotected sections were in some instances totally destroyed, while in others the yields varied from 5 to 17 bushels. In oats many exposed plots were destroyed, those more or less protected varied in crop from 76 to 32 bushels per acre. One field of 9½ acres of Banner oats partly protected by a tree plantation gave an average of 55 bushels per acre. Another field of 8½ acres of similar soil, sown with the same variety, only slightly protected, averaged 27 bushels per acre. Fields of other sorts still more exposed gave less. One of seven acres, averaged a little over 15 bushels per acre, while six other sorts in smaller fields were so completely wind-swept that the crops were destroyed and the fields were ploughed and resown.

That season I happened to visit the Indian Head Farm just after one of these storms, which in exposed places had practically destroyed the growth of the grain above ground. On examining the fields which had been more or less protected by forest belts, we found that every foot in height of tree growth had afforded protection to from fifty to sixty feet of grain in the field; where the tree belts were from eight to twelve feet high the grain was preserved quite green for from 400 to 600 feet from the trees, whereas a few yards beyond this influence the crops were so wind-swept that not a single green blade could be seen.

In 1897, when the trees were smaller, very definite results were recorded from the protection they afforded. Banner oats sown that year within the shelter of a tree belt gave 101 bushels per acre, whereas the same variety on similar soil sown at the same time in an exposed place was injured by wind and gave only 52 bushels per acre.

Forest growth frequently helps the crops on the western plains by bringing about more favourable conditions of moisture. During the winter the air is so constantly in motion that much of the snow is blown off the level ground, drifting into the hollow places and coulees. Where tree growth is established, the snow is held and collected in gradually diminishing depth, sometimes for several hundred feet, into the adjoining field. If the spring is dry, the melting of this snow will produce conditions of moisture in the land most favourable for the germination of seeds, and this beneficial influence can

FARM HOUSE, INDIAN HEAD. (After Planting.)

be traced all through the season in the growth of the crop and is specially manifest in the returns of the harvest. Other instances of the benefit of shelter might be cited; but these, perhaps, are sufficient.

A tree is a thing of beauty, and we must not overlook the fact that a plantation of trees, apart from the advantages they give in the protection they afford, make a place much more attractive and homelike and produce in the minds of the settler and his family a greater feeling of contentment which usually results in a fondness for home and its surroundings, which helps to give stability to a newly settled district.

While the work of establishing tree growth mainly with native trees, was in progress on the Western Experimental Farms, the more purely experimental side of this work, that of the testing of all sorts of trees and shrubs, for the purpose of finding out those which were suitable for the country, was carried on with vigour. Many thousands of young trees and shrubs were sent up from Eastern Canada, and many more imported from the colder parts of the United States and Europe and planted out under many different conditions, using considerable quantities of each variety, so that the test might be a thorough one. This was done both with forest and fruit trees, and the results widely published. In this way much of the importation of unsuitable material has been stopped and a large and useless expenditure prevented. The experiments conducted on the farm have been extensive and thorough and the settler has been convinced of the futility of his expending money on unsuitable trees when they have been tried in numbers of from 50 to 500 or more each, on the Experimental Farms, and have utterly failed. These experiments have been exceedingly useful. Many varieties after thorough trial have proven hardy and the number of useful sorts of established hardiness is now ample to give great variety and some attractiveness to new plantations. Similar work with like results has also been carried on during the same period at the Experimental Farm for Manitoba, located at Brandon. There, however, the conditions for tree growth are more favourable than at Indian Head. The success in tree growing has been great at both farms, and those who visit these interesting places will find a very large number of species and varieties of trees and shrubs which have now been sufficiently tested to justify the recommending of them as hardy. In the Annual Report of the Experimental Farms for 1901, now in press, a list is given of over 130 different species and varieties of trees and shrubs which have been found hardy at Indian Head.

Careful records have been preserved of the cost of growing forest trees at Indian Head, account being taken of all the labour which has been devoted to the plantations and other expenses from the time the trees were put out until they were large enough to shade the ground so as to need no further cultivating. In some instances hoeing had to be continued for four years; in other cases, where the trees were slower in growth, for five years. The trees have been planted at different distances—2½, 3, 3½ and 4 feet —apart each way; and leaving out the cost of growing the young seedling trees, which is very trifling, the total expense of planting and care for four or five years has varied from $12 to $18 per acre.

While the work of clothing the bare prairie section at Indian Head has been in progress, what has been done to help the individual settlers, many of whom live too far from sources of supply of native trees and tree seeds to procure them for themselves? For the first year or two the erection of buildings and the organizing of the work occupied the entire attention of the staff; but in the spring of 1889 the work of distribution to settlers was begun. That season, 700 1-lb. bags of tree seeds were sent out, chiefly of box elder and green ash. These were distributed in response to requests received from farmers in different parts of the country. There was also sent from Ottawa, through the mail, 131,600 young forest trees and cuttings in 1,316 packages of 100 each. These were all forwarded free and circulars accompanied them containing instructions as to the preparation of the soil and the sowing and caring for the seeds and trees. In 1891, 200,000 more young forest trees were sent out from the central farm in 2,000 packages of 100 each; and 4,053 1-lb. bags of tree seeds. Similar distributions were made from year to year up to and including 1893; but since then the chief distribution to settlers in the North-west Territories has been made from Indian Head, and to those in Manitoba from the Experimental Farm at Brandon.

The total distribution which has been made to date to settlers in the Canadian North-west is as follows :—

	Young Forest Trees and Cuttings.	Tree Seeds in 1-lb. Bags.
From Experimental Farm, Ottawa.....	600,000	10,000
" " Indian Head..	290,000	4,564
" " Brandon.....	610,200	2,742
Total.....	1,500,200	17,306

This makes a total of 1,500,000 trees and cuttings distributed in 15,000 packages, and the total quantity of tree seeds distributed has amounted to about eight tons and three-quarters.

Specific instructions have accompanied all this material to guide the settler as to the proper preparation of the land and treatment and care of the seeds and young trees.

In the meantime the trees planted and now growing on the five experimental farms number about 245,000.

The teaching and example of the experimental farms, associated with this large distribution of young trees and seeds, have produced results in the Canadian North-west which are now everywhere apparent. On homesteads in almost every part of Manitoba and the Territories there are small plantations of forest trees which furnish more or less shelter for buildings and stock, also for the growing of garden vegetables, fruits and flowers, and at the same time add beauty to the surroundings and make the dwellings of the settlers more attractive and homelike.

Since the establishment of a forestry branch by the Department of the Interior, the experimental farms have rendered willing help in the collection of seeds of trees and shrubs, and have set aside a sufficient area of land for the growing of a large number of seedlings for this special branch of work. During the past year over 200,000 young trees and shrubs have been grown from seeds and cuttings for the forestry branch, and preparations have been made for the further development of this useful work. It is not, however, proposed on this account to lessen the good work the experimental farms have so long had in hand ; but to vigorously carry on the propagation and distribution of useful trees as in the past, sending these out with tree seeds, as far as is practicable, to all who apply for them.

Many of the plantations of young trees established with the experimental farm material, years ago, are now bearing seed, and with these seed centres increasing in number from year to year, the quantities of seed conveniently available annually will give an enormous and increasing impetus to tree growing on the North-west plains.

The CHAIRMAN—The paper following this is on the 'Work of the Forestry Branch in Tree Planting on the Prairies.' The papers are very much on the same lines, and we might discuss them together.

Mr. GEORGE JOHNSON—What proportion of fruit trees are you having planted in the North-west, compared with other trees, and is that proportion greater of late than in earlier years?

Dr. SAUNDERS—Practically all the experiments with fruit-growing for the first early years were failures. We have tried over two hundred varieties, including all the hardiest varieties of apples obtainable in the northern part of Russia and the United States, and in fifteen years have never raised an apple. Most of those trees are dead. It is only seven years since this experimental work to which I have referred, of cross-fertilizing, was begun. The earliest of the *Pyrus baccata* trees was from seeds sent me by Dr. Rigal, from the Experimental grounds in St. Petersburg. I wrote to Dr. Rigal that winter and asked him to send me seeds of those and other varieties, which he did.

The seeds were started in 1897, but it was only after those had been grown and we had had one or two years' experience with them that the idea suggested itself of using this tree as a basis for future experiments. It took four to six years before these trees bore their first fruits. Then the question arose as to whether they would be hardy in Manitoba. It has taken two or three years to demonstrate that. Now, having been perfectly satisfied that they are hardy, I am making the best use I can of every particle of wood I can get from those trees by grafting and budding, and we hope by the spring of 1903 to have enough of those young trees so that they can be tested over the different parts of the North-west that have not yet been covered with them. We are also growing an immense number of seedlings from them, from which I hope good results will be obtained. There are now growing at Indian Head and Brandon, I suppose about a thousand different varieties of these cross-breeds and seedlings, and something more than a thousand at Ottawa, and we hope from among that number to get some very useful trees.

Mr. GEORGE JOHNSON—Do you have bees up there?

Mr. SAUNDERS—Yes, we have bees. They do not succeed well at Indian Head; we have tried them two or three times. At Brandon they do very well.

Mr. E. STEWART—The Committee asked Mr. Ross to prepare this paper, but before the meeting was called he had to go to the North-west, and having written it, he left it with me to read. I desire to emphasize what Dr. Saunders has said with regard to the field of the North-west. There is abundant field for what little work we are doing there, and what the Experimental Farms are doing. The difficulty is to overtake the immense work that is offered there. I may say, before commencing to read this paper, that the Forestry Branch is not attempting any experimentation, leaving that entirely to the farms. We are taking the results that the Experimental Farms have demonstrated—what trees will grow, and utilizing those. This paper will probably give an idea as to how it is carried out. A year ago, at the annual meeting, I read a paper outlining the system we were then about starting, and this will be in a measure a continuation of it.

WORK OF THE FORESTRY BRANCH IN TREE PLANTING IN THE NORTH-WEST TERRITORIES AND MANITOBA.

By Norman M. Ross, Assistant Superintendent of Forestry for the Dominion.

The work of the Forestry Branch in Canada is of a twofold nature, one division consisting in the preservation and protection from fire of existing timbered areas, and the other the encouraging of tree planting on the western plains where the absence of trees and large timber belts is a great obstacle to the practice of many branches of agriculture, and no doubt deters many from making permanent homes in the West who otherwise would do so.

This paper deals only with this latter phase of the work and the results which it is hoped will be obtained by the efforts of the government.

The planting of trees on the prairies is a question not only affecting individual settlers, but is also of economic importance to the whole country, as there is little doubt that with increased protection afforded from winds, which at present cause such an immense evaporation of soil moisture, that can ill be spared, and which also greatly hinders stock-raising in many sections, the general productiveness of the country will be greatly increased.

The practice of growing large bodies of timber wholly with a view to deriving revenue from them is not likely to be indulged in for some time to come, although with the enormous prices which lumber commands in the West, it is not at all improbable that such investments would pay on the poorer soils. The railway companies, looking to their future supply of railroad ties, which will be constantly required, might find that the planting of certain varieties, with that end in view, would be very profitable. Such trees as Scotch pine, larch and jack pine, which are hardy throughout the greater part of the West, might be found useful for this purpose.

Several of the larger railway companies in the States are devoting some attention to this question, and in some cases plantations have already been started in the western states for the raising of telegraph poles and ties. Catalpa is the variety mostly used, but that is not hardy in the Canadian North-west.

Those who attended the last annual meeting of this association or who have since seen the published report of the papers read at that time, are already familiar with the scheme of co-operation which the Forestry Branch has adopted, which was explained in a paper given by the Superintendent of Forestry, by which it is hoped that prairie settlers may be induced to regard tree planting as both practicable and profitable. Briefly

VIEW OF SPRUCEWOOD RESERVE, NEAR SEWELL, MAN., showing spruce growing in exposed situation on the prairies.
The trees average about 40 ft. high. The soil is almost pure sand.

the scheme is this. The government, through the Forestry Branch, endeavours, as far as possible, to furnish plant material and technical information to all those owning land outside of towns and villages, in the treeless districts. On his part the settler agrees to set aside as a permanent woodlot or shelter belt a certain area of ground which must be suitably prepared and otherwise adapted for tree growth, and after being planted must be properly looked after and protected against stock and fire. All the work in connection with the establishment of these plantations is done at his own expense by the settler, who also agrees to follow out instructions received from the Forestry Branch through its local agents as to the details of the work. The trees growing on these plantations cannot be cut off, and the land used for other purposes than for growing wood crops in later years unless the consent of the Forestry Branch is first obtained. After being set out these plantations are to be inspected periodically by agents of the Forestry Branch to see that they receive proper care and attention.

As the above scheme was only adopted last spring, it cannot be expected that much has as yet been accomplished. It was not at first expected that any plant material would be distributed last season, but several applications were received early in the year, and as it was thought unwise to disappoint those who had ground in good condi-

tion, and as a start, even if very small, would help to keep up the general interest in the work, arrangements were made to supply a few applicants with the necessary seedlings trees. In all about forty settlers in Manitoba and the Territories were supplied, about 60,000 seedlings being apportioned among them, these being set out in plots varying in size from three acres downwards. The varieties used were principally Manitoba maple, Dakota cottonwood, elm and green ash, as these were the most easily obtained. The results of these first plantings are very encouraging as, with only one or two exceptions, all the plantations were in good condition last fall, and out of the number I inspected in the Territories at least 78 per cent of all trees planted were alive at the commencement of the winter. The percentage in Manitoba, from reports received from the local agent, is just as high. Last year, with the exception of a few weeks of very hot and dry weather, which came just during the planting season, was a particularly favourable one for tree growth, as in most localities the rainfall was unusually heavy. The fall in some localities was perhaps too wet, thus encouraging late growth of the new shoots which in some cases failed to fully mature before winter set in. The present winter in the West will undoutbtly be a very hard one on young trees as so far, from reports received, very little snow has fallen, thus leaving the seedlings much exposed. The lack of snow may also prove an evil in limiting the amount of moisture in the soil when spring planting commences.

Since early last spring applications have been steadily received at the office here, showing that the western settlers fully realize the advantages to be derived from tree planting. During the five months that the Forestry Branch was open to entertain applications for co-operation in planting this spring, about 500 settlers in Manitoba and 200 in the Territories expressed a desire to avail themselves of the proposed scheme. The farms of nearly all these applicants were visited last season, and the land which they proposed to plant up was inspected. If the soil was found to be in a suitable condition for tree planting the owner was advised as to the best methods of planting, and the varieties best adapted to their locality and soil. In some cases the land was not in a sufficient state of cultivation, and then instructions were given as to the best means of preparing it to receive trees in the spring of 1903. Out of the 700 applicants about 450 will receive trees this spring. The remaining 250 either did not have their land in a fit condition or were already situated in naturally wooded districts. Some four or five did not wish to be bound down by any agreement.

At the present time the co-operative scheme is not as widely known as it should be throughout the West, but the number of applications already received shows that the settlers mean to take full advantage of the system, and it will no doubt require effort on the part of the Forestry Branch to keep the work successfully in hand, at least until some permanent arrangements can be made for the raising of the young stock for distribution. The question of being able to raise a sufficient supply of seedlings to meet the demands made by applicants is one of considerable importance, as upon this depends to a great extent the popularity with which the work will be generally regarded and consequently the support which will be received from the settlers themselves.

At present the work is only in its infancy, but even now it is easy to see that it is of the utmost importance that the Forestry Branch should have a sure source of supply from which the young stock required for distribution can be drawn. This spring 500,000 or more seedlings will be necessary to supply those who have already applied, and there is little doubt but that next year two or three million will be required to meet the demand, with a gradually increasing number in following years.

Practically the only way in which a certain supply of young stock can be obtained is by establishing large nurseries which can be managed under the control of the Forestry Branch. Up to a certain limit the larger the nursery is the cheaper per thousand can the young seedlings be grown. Such places are absolutely necessary also as furnishing central points for packing and distribution of plant material.

The main features governing the selection of the points at which nurseries should be established are:—

1. Density of settlement, by which the extent of territory to be supplied is limited.
2. Geographical situation. The nurseries must be situated as centrally as possible to facilitate distribution.

3. Shipping facilities.

4. Adaptability of the locality to the growing of such varieties as are hardy and of economic importance in the district to be supplied.

According to conditions affecting tree growth and the large districts to be supplied with trees, the prairie section may be divided into three parts. These are, roughly:—Eastern Manitoba, Western Manitoba and Assiniboia, and Alberta. As the work of tree-planting increases it will undoubtedly be found necessary to have at least one nursery in each of these districts. As far as certain varieties are concerned which are hardy all over the West, it might probably make little difference whether they were raised in Manitoba or Alberta, but some varieties are hardy and of value only in one district and not in another. For instance, in Eastern Manitoba the scrub oak and basswood are hardy natives, and are on the whole the most valuable trees for that district, and as such their planting should be encouraged as much as possible. These trees cannot be raised successfully in Western Manitoba, and hence a nursery for this purpose is desirable in the eastern part. Where the basswood and scrub oak grow many other varieties not native may no doubt be successfully introduced later on. For instance, the soft maple *(Acer Dasycarpum)* grows well in the Pembina Mountains at Nelson, and at Brandon I saw two fine specimens each over twenty feet high, growing in private grounds. The scrub oak is not, as its name would lead one to suppose, a scrubby tree when grown under favourable conditions. In the Turtle Mountain and Pembina Valley it attains a considerable size, trees two feet in diameter and fifty to sixty feet high being not uncommon. At Nelson, in Southern Manitoba, I was told that a scrub oak log measuring twelve feet in length sawed over seven hundred feet of lumber. This was about ten years ago. Of course all the largest timber has been pretty thoroughly cut out by now, although the stumps remaining show that there were very fair sized trees growing a few years ago. The scrub oak is used largely for fencing, affords excellent fuel, and is also used by the settlers for small repairs to machinery, &c., where hard woods are required.

Further west, and on poor, sandy soil, such as at Oak Lake, this tree has a dwarfed and stunted appearance which probably accounts for the name under which it is popularly known. About Moosomin, on the main line of the Canadian Pacific Railway, the western limit of growth for this tree is reached. Its economic limit is probably not much further west than Brandon, and therefore if it is to be one of the varieties used in prairie planting it can only be successfully raised east of Brandon. The same holds good with the basswood and soft maple.

As far as the central district is concerned, the chief feature pointing to the necessity of a second nursery there is the very large area of country to be supplied rather than any natural conditions affecting tree growth.

In Alberta, although a nursery may not be immediately demanded, the conditions of climate and those affecting general plant growth give evidence to the fact that the number of varieties which will eventually prove hardy there will be found to be greater than that in Assiniboia and Western Manitoba, as natural conditions seem more favourable. In most parts of Alberta fall wheat and clover are successfully grown, and this would seem to indicate that tenderer varieties of trees might also be introduced. I think there is little doubt that various kinds of evergreens will ultimately be the principal trees used in this district, as they can better withstand the sudden changes of temperature due to the 'Chinook' winds than can most of the broad leaf trees. It is claimed by some of those who have tried it that the Manitoba maple cannot exist in Alberta for many years. Others, however, hold a different opinion.

Undoubtedly there are many natural difficulties to be combated against when growing trees on the prairies. Whether or not what is now prairie has been in its present treeless state from earliest times is a question it would be found hard to answer. Certain it is, that the area of the prairie is, at least in the more thinly populated districts, gradually increasing owing to the inroads of the constantly occurring prairie fires upon what little timber there is left. There is much ground for supposing that at one time at least a very great portion of what is at present prairie was wooded with the native varieties. Even now one can observe almost everywhere in the more thickly settled parts, where fires have not been known for several years, small patches of native

PLANTATION SET OUT UNDER GOVERNMENT CO-OPERATIVE SCHEME ON FARM OF J. A. JOPLING, ESQ., FAIRLIGHT, ASSA. [79]
Planted in spring of 1901. Cottonwood, Elm and Manitoba Maple.

aspen coming up. On the farms where these natural bluffs have been specially protected they grow very rapidly. Such observations as these would seem to show that as in the East so in the West, fire is the chief enemy to the natural growth of trees, and that the nature and condition of the soil and climate are not so much to blame for the absence of tree growth as has been supposed. Of course the longer the soil remains unprotected by trees the more compact it becomes and therefore conditions for tree-growing tend to become more unfavourable year by year. However, we must take conditions as we find them, and over the greater part of the West there are certainly serious but by no means unsurmountable difficulties to be overcome by the tree planter.

Perhaps the chief obstacle to tree growth is the absolute lack of protection against the elements. This necessarily limits the pioneer planter in the selection of varieties, as only the very hardiest trees can be used. Unfortunately these are for the most part of small economic value and rather short lived. Perhaps the most valuable tree we have for the prairies is the Manitoba maple; it is native to the greater part of the West and is a fairly rapid grower. It is a good shelter or nurse tree and the wood is looked upon by the settlers as providing excellent fuel, and for this reason unfortunately it is being rapidly cut out in any localities where it grows at all plentifully. Another disadvantage which trees suffer from owing to exposure is the excessive evaporation of soil moisture caused by the hot winds of the summer season.

The very limited rainfall is another serious drawback. The amount available for tree growth may, however, to a certain extent be increased or rather preserved by constant surface cultivation, and there is little doubt that as the trees grow older they must have a beneficial influence on the humidity of the air and in naturally preserving the soil moisture which will be greatly augmented by the melting of the snow caught and held during the winter. In places where irrigation can be practised the forester is more independent of nature's supply.

A third difficulty is the very compact nature of the soil due to long years of exposure. However, as this condition can be easily altered by the application of labour, it cannot be considered in so serious a light as the other two just mentioned.

Reasons for failure:—Out of every hundred settlers who have taken up land in the North West it is safe to say that at least 80 per cent have at some time tried to improve their farms by tree planting. The number of those who have been successful in their efforts is, however, very small. The effect of the failure attending their first attempt has been, unfortunately, to deter many from making a second trial, and the blame has been laid to the severity of the climate and the general unsuitability of the prairies to tree growth.

If, however, the conditions under which the trees were set out could be known, it would undoubtedly appear that in ninety-nine cases out of every hundred, the planter and not the climate or soil was responsible.

The great lack of knowledge on the part of the average settler as to the ordinary requirements of a tree and the conditions affecting its growth accounts in a great measure for the large number of failures. The average farmer does not seem to consider trees in the same light as he does any of the other plants he cultivates, nor does he seem to realize that any special care is necessary to grow them. No practical farmer would think for a moment of sowing wheat or planting potatoes on ground that had not been previously brought into a high state of cultivation, but in most cases anything is considered good enough for a tree so long as the roots are covered in some way. Lack of proper preparation of the soil undoubtedly can account for by far the greater per cent of failures in western tree planting. Other sources of failure are:—choice of unsuitable varieties, either not hardy or not adapted to the soil on which they were planted; lack of cultivation and protection after planting, taking trees from well-sheltered woods and placing them suddenly in very exposed situations; and using trees which were too large.

By means of the scheme outlined in the first part of this paper it is hoped in a large measure to educate the settlers in the general principles of tree culture and they will then be able and willing to work independently with less danger of failure attending their efforts than in the past. It was realized that the only practical way to thoroughly arouse general interest and co-operation in this work among the land owners of the West was in the first place to supply free plant material. Many schemes have been

tried and much money has been spent by the governments of both Canada and the United States, with the object of encouraging western tree planting, but up to the present these have proved unsuccessful. At present in the United States there is a co-operative scheme in operation upon which the one adopted by the Forestry Branch here is based, with this main difference, that no plant material is supplied by the government in the United States. The scheme there applies principally to the more wealthy class of settlers who can afford to devote the time and expense necessary in setting out comparatively large plantations. In Western Canada the percentage of wealthy farmers is very small and the average settler is averse to spending money or labour on any work, to him, of doubtful issue. The settler here, after observing the growth of the few acres of trees supplied by the government will soon see that tree culture is not so impossible as at first anticipated, and that a very fair growth can be obtained in a reasonable time, thus making it profitable to devote a portion of the farm to the raising of fuel and fencing material. There is no doubt that in the near future the question of local timber supply will be a very serious one; the present supply in the settled districts is extremely limited and of course is being more heavily drawn upon year by year, and although coal is being used in increasing quantities the demand for wood for fuel and other purposes is in no way lessened. Under such conditions as these it seems that a portion of every farm could be most profitably devoted to tree growth, even if fairly good agricultural soil had to be used. The presence of a well stocked plantation of twenty or thirty acres on a farm situated perhaps thirty or forty miles from any natural growth of timber would increase the value of such a holding immensely.

It may be asked whether the government is justified in going to the expense of assisting individual settlers in this work. An answer may be got after giving the following points consideration: 1. Although the individual is directly and immediately benefited, the country as a whole derives in an indirect manner considerable good if the work can be carried out pretty extensively. 2. By the presence of large bodies of trees the general humidity of the air is greatly modified and local *precipitations are certainly increased, thus greatly adding to the agricultural advantages and possibilities of the country. 3. Under the shelter afforded by windbreaks of forest trees many branches of agriculture at present unprofitable in the west, for instance, fruit growing, may be successfully carried on on the farm. 4. The general value of land will be increased by the presence of timber belts. 5. The settlers will become more satisfied with their surroundings and will consider the West not so much as a place in which to make as many dollars as possible in a short time and then return east to a more comfortable home, but will be induced to look upon the prairies as suitable for the establishment of a permanent home. 6. The certainty of obtaining a reasonable fuel supply without much expense, close at hand, will be an additional inducement to settlement.

Mr. STEWART—I may say that in the Annual Report of the Forestry Branch here, which is sent out in monograph form, reference is made to a plantation set out last spring under our system. I wish to say, regarding what we were considering and what has been said about considering moisture, if you will notice the bulletins that are sent out to the settlers, you will see that the ground must be put in a proper state before trees are sent to them. The ground must be broken up and not left in stubble. There is another paper by Mr. Pearce, and as it is on a kindred subject, we might read it too, and dispose of the forenoon's programme.

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*This does not mean that the total rainfall over a large district is increased, but that trees if numerous enough in any locality have an effect on the general distribution of the total rainfall. This can be seen on the prairie in the Turtle Mountains and Moose Mountains.

SCHEME TO PROMOTE AN INTEREST IN THE GROWTH OF TREES, SHRUBS, FLOWERS AND PLANTS, THROUHOUT THE TREELESS PORTION OF THE TERRITORIES.

Wm. Pearce, Inspector of Surveys, Calgary, Alberta.

If an interest in the above should be created in the school population and also in their mothers and elder sisters, a very long step in advance would be made. If all those take an interest we can ignore the balance of the population. They will be forced into line or made to contribute to the cause, many of them probably very unwillingly.

If the school population can have their interest aroused at not too great a cost, it is advisable that such should be done.

The writer, in 1896, tried to induce the educational authorities of the North-west Territories to take up this matter, but without success. It is to be hoped that further agitation will bring better results.

The scheme as outlined in this paper, if properly managed, should not prove too expensive. It is submitted as being the reverse.

The land or plots required for the purpose would not be extensive in area nor costly. In fact they could in many cases be obtained practically as a gift.

Adjacent to each school let there be a suitable plot of say three or four acres set apart, or as nearly as possible thereto.

In cases of towns and villages where there is more than one school, and also where in the rural districts two or more schools could be readily combined, it might be well to have one plot in common; but each school to have its separate holding in same. It is anticipated that interest would by so doing be stimulated.

Let the plot or so much of it as may be required be broken, the sod thoroughly rotted and the soil as thoroughly prepared as may be readily possible.

When that is done at the proper season, furnish the pupils the trees, shrubs, flowers and plants which will likely succeed, that is, will grow. In the first inception confine the experiments to those which should with fair care succeed and afterwards extend the operations, making these experimental plots. The experiments might also include tests for grain, grasses and vegetables.

First plant small specimens thickly; when they are large enough to require thinning out, give the child or children who have charge of the plot those which are to be removed. He or she would likely take a strong personal interest in their future growth and in many cases they would probably be among the first efforts at beautifying his or her home, one of the chief objects of this association, and even if not so utilized, would no doubt add greatly to the object in view.

At first no doubt instructors would require to be sent around to show how operations should be carried out. In some cases probably the teachers would be competent. In a very few years they and the elder pupils would have sufficient experience to be able to furnish most, if not all, the necessary instructions.

The parents, guardians and friends of the pupils, if called on for assistance, would in many cases no doubt gladly contribute.

Distribute literature in the shape of text books on the growth of what is desired, such literature and text books to be attractive in style. Some of the literature on this subject prepared by the Boards of Education of some of the States of the Union is particularly so. The State of North Dakota is cited as an example.

In an agricultural country should not the teaching of the branches called for in this scheme be placed among at least the leading branches, if not made the leading one?

The manual training schools in Canada which Sir W. C. McDonald has so handomely established have proved such a thorough success that one is encouraged to extend the principle. Would not this scheme be such? During the season let every pupil be occupied

for a certain portion of every favourable day in looking after his plot or a portion thereof. This to be extended to create an interest in the study of the chemistry of soils, discovering what constituents are lacking and how the deficiency can most readily and cheaply be supplied. The youngest child in school might have his interest excited and attention directed to this subject. If such be the result the cost will be many times returned.

To stimulate interest it might be well to give prizes of two classes, one to be competed for in each year among the pupils of the one school or combination of schools, the other among the various schools of the district, districts to embrace whatever areas, having due regard to climatic conditions, as would as nearly as possible be similar.

This is submitted hoping it may provoke discussion or at least direct attention to the objects this association has in view.

FORESTRY IN PRINCE EDWARD ISLAND.

BY REV. FATHER BURKE, ALBERTON, P.E.I.

Only within the last year or so is the sense of our great loss as a province from the almost total deprivation of our splendid forests forcing itself upon us irresistibly. Not only are our fields often wind-swept, sunburnt, flooded in spring and parched in summer; not only are the purling springs dried up and the deep wells ungrateful, not only is life deprived of its healthfulness and pleasure; not only are the beauties of the green wood alternating with fruitful field and rippling rivulet passing away, but we are face to face with a wood famine which threatens us with permanency if something be not at once done to repair the ravages we have so thoughtlessly made on our forest. 'Forewarned is forearmed,' and it is to be hoped that as this is a matter that comes home to all, all will bend their energies to repair the wrong the past has done, by protecting what is left of our woodlands, by allowing the waste lands to grow up again and by a vigorous campaign of provincial and private reafforestation. The old countries have had this question before them and are now all bent on its reasonable adjustment; even India has a system of forestry which is the pride of the world. We may not get our governments to order the planting of a tree for every one cut down as in Germany, but we must educate the people so that of their own free-will, recognizing the necessity and value of such action, they will not be satisfied with the planting of one tree for the one removed, but will follow the advice of the dying sage farmer when he said: 'Son, whenever you find a spare moment, plant a tree.'

One hundred years have sufficed to change our island province from a complete forest to one almost bare of trees, and that forest was indeed a most varied and beautiful one. Its flora comprised a large range of conifers and deciduous trees—among others the fir; the black, red and white spruce; the stately hemlock; the red and white pine; the larch and the cedar and the maple in four distinct varieties; the white, black, yellow and canoe birch; the wide-spreading beech; the elm; the ash in variety; the oak; the aspen, the cherry and many more inferior species. The ax, the torch, man's stupid cupidity and the government's entire neglect have almost swept away this invaluable heritage.

When some ten years ago our most progressive citizens opened their eyes to the conditions about them, and began sounding a note of warning as to the serious difficulties confronting the province because of the loss of its forest, many smiled incredulously and asked themselves a self-sufficient, 'What next?' Up to this the general desire, and indeed the practice founded on it, was to get rid of every tree in sight. Thank heaven! there were some notable exceptions; but this policy was all too general; and to-day whole settlements may be visited where the farm buildings stand out bleak, bare and storm-beaten, without a single tree to protect, beautify or endear—not one along the roadside, the line fence, the out-places; possibly a bit of coppice on the rear of the half-

tilled farm, where the improvident holder still gathers enough of sapling wood to sustain the kitchen stove in hard weather.

Our forefathers, without distinction of nationality, and, I suppose naturally enough for the pioneers of a new and wooded country, thought they could not too quickly remove the forest. Their children accepted this short-sighted policy of their forbears without question. The government whose function ought to be to safeguard the resources of the country failed to perform, in this regard, its duty. Three generations have seen a magnificently wooded island converted into an almost bare plain—without protection and often parched for want of water. We have just passed through a season of extreme drought and convinced ourselves of the serious situation that confronts us. The connection between forest and water supply all are now ready to admit. Streams never before dry—the perennial streams of our youth—stript of the luxuriant trees that grew along their banks were this year early waterless; others, not previously so copious, because of the woods conserved at their sources and the stand of trees on their banks blessed the localities through which they flowed with an abundant supply of sweet waters. Then we had an opportunity to watch in this drought the effect of forest on the crops. Where clumps and groves and windbreaks of trees stood, near by the growing crops, our experience was decidedly in favour of this condition as compared with those on fields of equal fertility not so situated. Moisture is everything to vegetable growth, and the forest is the constant moisture distributor of nature.

To add to our difficulties forest fires, the baneful attendant of dry seasons, were aflame wherever any body of trees remained; and, as a consequence, much of the woods left in sections was overrun and to-day there is more firewood being hauled to market than for many years aback. Our scant forest areas are, therefore, still further curtailed. Last year a Forest Fires Act was passed by our legislature. If it meant anything it meant the safe-guarding of our remnant of woods. Still I have not heard of one single prosecution under its provisions, although careless fire-setters have robbed many a man of his wood reserve altogether.

In sacrificing our splendid forests after the manner described all now recognize that we have eliminated from the list of our provincial resources a great element of wealth and comfort. We might certainly be still supplying ourselves with firewood, and all the timber and lumber required, as well as be putting on the market many of the products of wood, without impairing, nay, improving immensely, our agricultural possibilities. We are obliged to import to-day all our lumber. The government by a proper system of reserve might be adding to its depleted treasury in a substantial way, too, if it had understood the value of the forests in time. We have now too many badly tilled fields and too few wooded ones. In bringing this sad change about we have doubtless deprived ourselves of many comforts, adversely affected the sanitary, climatic and aesthetic conditions of life amongst us, and greatly reduced the agricultural capabilities of the country. Over whole sections of the province the wild winds of the gulf sweep, unopposed by any forest barrier, entailing much hardship in the cold, and drying out the crops in the warm season. The settlers shortsightedness and the State's neglect have brought all this trouble upon us.

But it were indeed futile to direct attention to this crisis in our provincial life if there were no way of remedying it effectually. What are we going to do about it, outsiders will ask. Indeed, this is the problem we must work out to our own satisfaction, now that we have awakened to the seriousness of our position.

In a small and revenueless province like ours where the lands have almost entirely passed from the Crown, we are confronted with the greatest of obstacles a project of public importance can meet—want of money. Naturally the province is well adapted to re-afforestation. Indeed, I believe that a good stand of trees can be grown here quicker than anywhere else in all Canada; but to effect this we require legislation and the forestry regulations necessary to get whatever private and public reserves we can under way, and spread the information all this imperatively calls for. With us the lands were early acquired by the province, which sold them out quickly to the holder. Now, upon inquiry, we find that out of 1,280,000 acres, which comprise the province, we hold under governmental control only about 16,000 acres, and this remnant is scattered all over the province and made up of

the refuse of its lands. This little province, which is 111 times smaller than Ontario, for example, has all the legislative machinery and much of the expense of administration of the greater province, with none of its forest or mineral resources. We can hardly hope to carry the sail which even now we have spread; and, in our very restricted circumstances, must not, I suppose, expect any considerable expenditure for forestry on the part of the government. Still something must be done and done quickly, and we have put the whole matter before the forestry officials of Canada and the United States, with a view to finding out the best means of proceeding, as possibly the great experience of those experts may have comprehended cases somewhat like our own in the whole range of national administration. Those gentlemen are all solicitous for our welfare; they deplore our condition as to forest area; they are anxious to suggest and to help; but, without the sinews of war, they feel powerless to advise with any effect. Dr. Fernow, America's greatest authority on forestry, puts the matter rather facetiously to us: 'You have a dilapidated house, which you cannot rent or make use of; somebody else owns half or more of the title; he is unwilling to spend any money to rebuild and you have none to spend; you ask an expert what you can do with it. Answer: Leave it alone.' But even in this sad plight we cannot desist from essaying to remedy our forest conditions—nothing is impossible where there is a determination to overcome even the most untoward circumstances; and we have now brought even the practical doctor to approve our plan of campaign, which, simply stated, is this: we will ask the government to name a commission of patriotic men, with a heart for this work and no inordinate thought of self in mind. This commission will visit the 16,000 acres of provincial lands, and wherever suitable erect them into reserves, where they will either grow up naturally in trees, as the land does quickly here, or be afforested—sown out to seed. We will be able without much cost to get caretakers for those reserves, and in fifteen or twenty years they will be bringing in a considerable revenue. We also propose to encourage private individuals in the preservation and extension of their present wood plots and in the reafforestation of the denuded places of their holdings—places which were never intended by nature for the cultivation of crops; in the setting out of plantations for economic purposes; in protecting stream-heads with forest growth and in the placing of windbreaks and shade trees generally about the steadings. Ultimately we may be able to secure such official expert advice as will properly locate those plantations for any private citizen desirous of going into sylviculture, indicating what and how to plant out and the best means of preservation. We hope, too, that public opinion being aroused and moulded by considerate governmental action, will have the effect of stopping at once the ravages of the axe and torch in our remnants of forest; that the educational department will assiduously inculcate a love of trees for their great value as for their beauty among the rising generation; that a general impetus will be given forestry work all round, so that, in another decade or two, trees and forest commensurate with every necessity of life will make our island home what providence intended it—a sojourn of beauty and health and comfort unequalled by any other portion of this favoured Canada. Whoever helps on this happy consummation is engaged in a most patriotic as well as meritorious work uplifting the people. He is getting closer to nature and nature's God—

> 'He knows the gospel of the trees,
> The whispered message of the seas;
> Finds in some beetle in the road
> A power to lift the human load;
> Sees in some dead leaf, dried and curled,
> The deeper meaning of the world;
> Hears through the roar of mortal things
> The God's immortal whisperings.'

Mr. R. H. CAMPBELL—In reference to the paper that Mr. Pearce has submitted, I wish to say that Professor Robertson is here this morning, and as he had practically all to do with the plans of Sir Wm. Macdonald in connection with the schools, we would be very glad to hear a few words from him on the subject.

The CHAIRMAN—I will call upon Professor Robertson to address us. I should like to say that it is very encouraging to hear such papers as these which have just been read to us. It shows that there are some men in this Dominion who are anxious, with ourselves, to protect our forests and to do that which we are all so anxious to do—save our country from the destruction of our forests and to replace them.

LAYING ON THE ICE.

Professor ROBERTSON—Mr. President and gentlemen, I had no intention whatever of speaking here this morning, but I am greatly interested in the work of the association. I am glad its meetings are calling attention to the need of paying more heed to the trees of Canada, and I was delighted last night that the association also gave us the treat of listening to a magnificent lecture from Dr. Fernow, illustrated with beautiful photographs. I thought when Dr. Fernow began that probably his voice might fail, but I was quite sure he would know one thing after he came to Ottawa—that it was the best sanitarium in the world for getting powers of speech, on account of the fact that we hold our parliament here. Mention was made of the training schools. There are now about 8,000 people every week receiving instruction in

regard to wood and the manufacture of articles therefrom. Altogether some 7,400 boys have half a day a week of special instruction and practice in handling woods, and about 600 teachers are employed. I know very well that it is not forestry, but since reference is made to that kind of work, that also is included in it and has a practical bearing upon practical forestry, because in all those towns and cities, with one exception, the children are taken four or five times in summer to visit woods that are growing, and teachers go with them to explain the different varieties of trees and the best methods of cultivation, and the uses of the trees. The intention is to spread that work into a new branch which I think will be allied with this association's work, and which will have its co-operation,—that is the improvement of the rural schools along lines which have been adopted at the manual training school. Anyone travelling through Canada would have the judgment forced upon his mind that we Canadians thought trees to be things to be banished from the country. You cannot erase the impressions formed in the years spent at school, and taking the country schools as a whole, I think seven out of nine have very few trees, that the tree is forbidden to be within the precincts, that it is regarded as an objectionable presence which the child must forget. And the same thing around farm steadings. They think if the school does not require it for beauty, the farm steading can do without it, and we propose to have trees growing in the corners of the school yards, that the child may learn to love the trees for their own sakes. I think that will teach them to appreciate the trees on account of their beauty and for climatic reasons. If you can once get the general public impressed with the notion that trees are necessary for happy human life, that trees are really a necessity for comfortable existence on the part of the globe we inhabit, we will have children taking steps to plant trees and see that they are protected. Only last week I passed the old farm we first settled on in Canada. We had then thirty acres of very good bush, and when passing it last week I think there was less than an acre and a half. That is not uncommon in Western Ontario, and in nearly every part where there was a good bush formerly protected for sugar making or wood for the house, these woods are disappearing. As I have said, we had thirty acres of woodland on our farm only twenty-seven years ago, and there is only an acre and a half now. I think that is a dangerous thing. It is a good thing that we are trying to supplement the work of this association to get the people of Canada to know the different kinds of woods and their uses, and to lead them out to the woods to show them how they are grown, and to have the children in country school houses to learn the meaning of different trees, to have trees at their schools and in the parks and to have wood plantations for private use. I think twenty-five years from now we will be in a position to say that we have appreciably modified the rainfall and moisture conditions of Canada. That is quite possible, and I think Sir Wm. Macdonald will do a great deal in the way of co-operating with this association in reference to the planting of trees about the school houses. The two matters do not conflict at all, and I shall be glad if Mr. Stewart will indicate to him the kind of trees that could be planted in school gardens, and I think the association would get co-operation in that way, because the school boy planting trees in this way would co-operate with him to work in the North-west as well as Ontario.

DR. FERNOW—Will you allow me to correct an impression which I am afraid Father Burke has left with you. He was kind enough to refer to me as being able to suggest some means of getting for Prince Edward Island something in the forestry line and I wrote him rather a longer letter than the remarks he has quoted, and my letter was to

this affect: Before you do anything you must learn what you are doing it for, you must know in detail your conditions. The physician cannot prescribe a remedy until he has made a diagnosis, and that diagnosis must be made on the subject itself and not in general terms, and therefore not knowing Prince Edward Island and its conditions, it will be impossible for me to advise you. I should like to take the opportunity of offering also a more positive advice in the case of the tree planting experiments which have been carried out so beautifully by the experiment stations. The first thing I would like to see is a very thorough co-operation between the two branches, the forestry branch and the experiment stations and especially when it comes to the growing of the nursery stock, I should be inclined to think the experimental station being established, and being a station to grow things, would probably be the best one to perform this part of the business. I have established a nursery in which we grow from one and a half to two million seedlings a year, and therefore I may speak from practical experience. I am able now to produce my seedlings cheaper than any nursery man that I know of. The only nursery man who really grows forestry trees in the United States in large enough quantities to be mentioned, is Mr. Douglas of Waukegan, Ill. There are others who produce smaller quantities. When I offered Mr. Douglas half a million seedlings at prices which were tempting to him and sent him my material, he wrote, 'It is evident you are in a place to grow conifers, and I am not.' I thought you might take a hint from this. If you establish a nursery, rather establish it where every year you can get success from your sowing, and where you will have no difficulty from climatic conditions, and the difficulties of transportation and distribution afterwards are a matter of mechanics almost altogether, and can be made almost any time independent of weather. By giving such positive advice, I hope I may have eradicated the impression from your minds, that my advice is always general.

MR. MCWILLIAMS—Perhaps Dr. Fernow could give us information in regard to the insects with which we are troubled on our trees. The doctor has, no doubt, often seen trees injured or destroyed by insects. Has he ever tried any application to the inside of the tree to kill the insects?

DR. FERNOW—If you refer to combating insects in forests, I could only give you the experience of the foresters of Europe, who are spending many thousands of dollars every year in fighting insects, or rather preventing them, just as with forest fires. Prevention in both cases is better than a remedy applied later on. Every year in those countries, a trial search is made to find out which insects are likely to become pests, and remedies are applied at once to prevent them doing damage. This is done in various ways, but very largely, and I may say mainly, in collecting them. It is possible to attract insects in certain spots where they can be collected, each species is treated according to its life habit, so that a general remedy cannot be applied. For instance, one of the commonest insects in the pineries that we have to deal with is the curculio, a little insect that punctures the leaves and the young wood, and it is very simply collected by putting fresh pieces of wood on the ground, on which they collect and can be gathered. There are a number of other methods, but the best way is to learn to know the insect in its various stages and collect it, either in the egg or the caterpillar state.

Mr. MCWILLIAMS—The old gentleman to whom I referred earlier, was experimenting in that line, and he bored a hole in the tree and put some mixture in and killed out the insects.

Mr. GEO. JOHNSON—Did he kill the orchard?

Mr. MCWILLIAMS—No; I had one hickory tree and a fruit tree which suffered from insects and I permitted him to experiment on them.

Dr. FERNOW—And they did not die?

Mr. MCWILLIAMS—No.

Dr. FERNOW—It did not do them any harm?

Mr. MCWILLIAMS—No.

Dr. FERNOW—Well, the insect did not develop. The remedy did not cure it. There are enemies of the insects which develop in the insect bed and destroy the insects, and the insects will all disappear. Every twenty or thirty years there will be one insect pest and remedies will be applied, but the insect goes on doing its damage until suddenly it disappears.

Mr. MCWILLIAMS—All the orchards in the neighbourhood suffered from the insect. This man tried his experiments and the insects were all killed off, while in the adjoining orchard the insects still exist.

Dr. WM. SAUNDERS—The difficulty would be to establish the truth of that proposition—as to whether that was so or not. Even if it were so, it could only be explained as Dr. Fernow has stated—that in these particular localities there had been an increase of the enemies of the insect, because insects are controlled by the insect enemies far more than any other element of nature. The forest caterpillar will sometimes run over scores of acres of wood, and the trees will become bare and next year there will be hardly an insect. If you examine those insects in the autumn you will find that they are diseased. There is a bacteria which spreads among them, the same as cholera and smallpox spread in the human race. Millions of them die. And then there are small flies in the bodies of these insects and these parasites prey on them and destroy them, and nature preserves the balance from year to year, so that when there is a departure and a multiplication of one particular insect, the enemies come along in hosts and destroy the species that have so increased, and the next year we have comparative immunity from the trouble which we have had in the past.

Mr. MCWILLIAMS—That would be done in the course of a few days or a week.

Mr. GEO. JOHNSON—We have the Minister of Agriculture with us this morning. We are in need of the sympathy of the powers that be, and I would suggest that he favour us with a few remarks.

The CHAIRMAN—I am sure we will all be pleased to hear him.

The MINISTER OF AGRICULTURE (Hon. Mr. Fisher)—I feel that I am not in a position to say anything that can be of value to this association. I have unfortunately been so occupied with other matters that I could not leave, that I have not had an opportunity of attending the meetings, much to my regret. I would have been very glad indeed to have heard what was going on, especially as I feel that the work of this association in Canada is one of the most important in the interests of the country at large. We have in Canada sadly neglected our forests and our forest wealth. We to-day are

squandering our forests still in a most extraordinary way, although I am glad to know that of recent years a little effort is being put forward by those in authority to check this waste and dissipation of our resources of this character. I am not prepared at the moment to say anything that can be of value to this meeting. It is a subject which I confess I have not studied as I would like to have had an opportunity of doing. It is a subject of which I do not know anything which would be of value to those who have come here charged with knowledge upon this subject, and who are well known throughout Canada and the United States as authorities upon it. Sometimes I have been appealed to as a minister of the Crown to take up work in favour of our forests. It is, unfortunately, out of my power, I think, to do this effectively. The forests throughout our country are largely in the hands of the provincial authorities, each in its separate province. There is some forest wealth of Canada under the control of the Dominion government and parliament and that is on the Dominion lands, the dealing with which is in the department of my colleague the Minister of the Interior. I was very glad, indeed, to find a little while ago that my colleague was quite willing and ready, and even eager to do what he and his department could to help preserve that portion of the forest wealth of Canada, and in the appointment of Mr. Stewart to take charge of that work I believe Mr. Sifton has made a long stride in the right direction; and I trust and believe that under Mr. Stewart's control and management, that work will develop more and more. It is beginning to show results already, although I think it is now only a couple of years at any rate that Mr. Stewart has been at work, but I am satisfied that more and more will have to be done. Anything that we can do in the way of influencing our people in the local or provincial governments, I am sure all of us in control of Dominion affairs will be glad to do. But the great and chief methods by which that influence can be brought to bear is in the education of public opinion in the country, we cannot hope or expect, until the attention of the people of the country is turned to the needs of forestry in Canada, that we are going to accomplish a great deal or going to get the governments to do much, I feel that your association might do a great deal in awakening public opinion and I think that perhaps, to a certain extent at all events, that is the direction in which your work ought to be done first. Your association, no doubt, could distribute a good deal of information as to the methods of improvement of forestry work. I do not know what the resources are in that respect, but the men who are here represent to a very great extent the different sections of the country. I trust that a good many members of parliament have been enabled to attend your meeting, and that their attention may be aroused on this subject. The propaganda and the spread of information, and the awakening of public opinion is necessarily a slow process. It does not matter how efficient an organization may be, for a year or two you may expect to have to work uphill, and rather with discouragement. But before long you will awake to find your association extended to every part of the country, with people enthusiastic in the work, and with public opinion formed. My own experience in all work of that kind,—and I have done a good deal of it from an agricultural point of view—is that there is a long period of preparation and discouragement, and suddenly you find yourself—I was going to say famous—but your association famous, and everybody supporting and endorsing it. I would, therefore, ask those who are particularly interested in forestry work, not to be discouraged at all if for a little time, you appear to be accomplishing comparatively little. You are laying the foundation for a great work in the near future. I was glad to hear what Prof. Robertson said in regard to the public schools. They are one of the channels through which public opinion can be awakened

perhaps to the best advantage, and even if it does not awake in the present generation, the future generation will have an advantage which we have not got. I am glad to have been here for a few minutes this morning, and I wish you all success in your operations. Anything I can do to aid you I shall be glad to do.

The CHAIRMAN—We are all much pleased to hear the remarks of the Minister of Agriculture, and I am sorry it was impossible for him to have heard some of the papers which were read at our meetings yesterday and to-day. We know that it is just as he said,—that it is a struggle. We have been only about two years in existence, and while it has been a great struggle, and we expect to have more of a struggle, yet it has been gratifying that our membership has been increasing very considerably, and we hope in the future that it will multiply and that we may spread the work all over Canada, and have the people interested in it. It is an educational system we are working upon. It is hard to get very many people to come out to our meetings, but the attendance has been very good here. And I hope our next annual meeting will be larger. The work Mr. Stewart has been doing has been a very difficult one, and those connected with him have also worked hard, and the government have done very wisely in selecting such a gentleman to take charge of their forests in the great North-west. I think, however, it would be well for the government to consider that they should not limit him to a very small amount, because with regard to forest fires, we do not know the amount of attention and work which has devolved upon Mr. Stewart and others to prevent fires. We hear nothing about these efforts, but when a fire occurs we hear all about it. We have understood from papers that have been read during the sessions, that great fires have been averted by the work that Mr. Stewart has done, and therefore I would remind the government that they should help him and not cripple him too much in the great work he is doing.

Mr. J. ROBINSON, M.P.—We are all much pleased with the papers we have heard this morning, and as some of the writers of those papers are not present, I think it is only right that we should give a vote of thanks, not only to those gentlemen who have read the papers, but to the gentlemen who have written them, and that we should print and circulate them so that people could read them. I am sure the government would be willing to contribute to the diffusion of that kind of knowledge among the people, and I think steps should be taken to see that sufficient copies are printed and circulated. I have much pleasure in moving a vote of thanks to those gentlemen who have furnished the papers which have been read to us during the two days that we have been in session.

The motion was adopted.

Mr. E. STEWART—In reference to what Mr. Robinson has said, I may say that we have published a report of the proceedings. All the papers are published. Last year's report you have in your hand now. We have published three thousand copies, and the government have allowed the Printing Bureau to do the work for us. This association would be pretty well involved in debt if it had not been for the aid we have had from the government. I do not wish any one to bring the matter up in the House on account of what I have stated here. It is no secret. What Mr. Robinson has said is quite right, a very large number of the papers can be distributed I think very profitably through the country but we are not able at present to do that. If the government wish to make a further appropriation for that purpose, they might do so.

The association then adjourned till 2.30 P.M.

AFTERNOON SITTING.

The Association met at 2.30 p.m.

THE PULP INDUSTRY IN CANADA.

D. Lorne McGibbon, Manager of the Laurentide Pulp Company, Grand 'Mère, P.Q.

You will notice by referring to your programme that the title of the paper which I am to give you is 'The Pulp Industry in Canada.' The pulp industry in Canada embraces so much matter, that were I to attempt to cover it in all its details, I would consume so much of your valuable time and attention, that I feel sure you would never want to hear the word 'pulp' mentioned again.

When your worthy Assistant Secretary first requested me to give a paper before this convention, he mentioned the fact that Mr. J. C. Langelier, Superintendent of Forest Rangers for the Province of Quebec, in his paper entitled 'The Pulp Industry in relation to our Forests,' had made reference to the complete system with regard to cutting timber, which would assure a supply *ad infinitum* for the Laurentide Pulp Company, and asked me for a paper, dealing with the system and organization of our operation of our timber limits, as well as the system pursued for the preservation of our forests. In reply to this request I stated that I thought a paper on the subjects he mentioned would be superfluous at this present time, owing to the fact that enormous quantities of pulp wood were allowed to leave Canada with a very small export charge, and that in the procuring of pulp wood for exportation more ruthless cutting, damage to forests and depreciation of same took place annually than the Forestry Association could hope to offset by the preservation of limits controlled and owned by the Crown or Canadian manufacturers. At the same time I mentioned the fact to your Assistant Secretary that I was not competent to give a paper on forestry or the preservation of forests, but that if it would be acceptable to your association, I would endeavour to show that Canada was not pursuing a proper policy for the preservation of her forests as an asset, and also was not getting the best possible results.

As you are all probably aware, pulp, whilst being a manufactured article from pulp wood, is still only a basis of raw material for the manufacture of paper. The two principal grades of pulp in use to-day are mechanical, or ground wood pulp, and chemical, or sulphite pulp. Mechanical, or ground wood pulp is almost explained by its name, as the process of manufacture is very simple, consisting principally of grinding wood into pulp. Chemical, or sulphite pulp is a very much more intricate process of manufacture, and consists in treating the wood by chemical process, and thus separating the fibres of the wood by the extraction of resinous material. In the manufacture of paper 70% to 75% of the pulp used is mechanical, and the balance, 25% to 30%, is chemical. Paper made altogether from mechanical pulp would not be satisfactory for newspaper or any of the finer grades, as the fibres of the pulp are too short to give the paper sufficient strength, so that it is necessary to use a proportion of sulphite pulp, which by its process of manufacture retains the long fibres of the wood, and thus gives strength to the paper.

The first consideration, therefore, to the manufacturer of pulp is his raw material and power. An enormous quantity of water power, on account of its cheapness, is necessary for the manufacture of mechanical pulp, and therefore it is usual for a pulp manufacturer to locate his mill at a point where there is good water power and where his source of supply of pulp wood is close at hand. A pulp manufacturer, having his water power assured and his source of supply of pulp wood for his raw material located, then figures on the quantity of raw material he will require for a season's operations.

For the manufacture of a ton of mechanical pulp it takes a trifle over a cord of spruce wood, and for the manufacture of a ton of chemical pulp it takes almost two cords of spruce pulp wood. If, therefore, the pulp manufacturer has a capacity of so many tons of each kind of pulp per day, it is very easy for him to figure the exact amount of pulp wood he will require for the operation of his mills for a year. If he should have his own limits, his first step in procuring his pulp wood is to know exactly what his limits consist of, and the amount of available spruce logs that are contained in same. As the government regulate the size of a tree to be cut, he must therefore only figure on cutting trees in accordance with these regulations. In the case of the Laurentide Pulp Co., who own such a large area of timber limits, we have found it more practicable to divide these limits into three districts, having a superintendent over each district. We have also found it much more practicable for each of these superintendents, by giving his whole time and attention to his district, to become thoroughly acquainted with all rivers, streams and lakes in same, and where the best points are to procure logs to advantage, rather than have one or two men for the entire limits, which by their large area would only permit them, to say the least, to have a superficial knowledge of it all.

Having, then, determined the quantity of pulp wood to get out in a season, and having your limits divided into districts, with a man thoroughly familiar with the conditions of each district, you determine the quantity you will get from each district. As a pulp manufacturer wants to ensure a uniform cost of his raw material for years, it is therefore bad policy for him to attempt to pick out the easiest spots to get pulp wood one year, and leave the hardest and more expensive places for a following year. Under the circumstances it is necessary for him to average this up, taking some of the expensive wood each year so as not to leave it all for future operations. It is the policy of most pulp manufacturers to procure their pulp wood, or at least a large portion of it, by letting contracts to jobbers or contractors. This to my mind is a very cheap way to procure pulp wood, but from my experience the results of this method are but temporary. It has been the practice in the past to allot a certain territory to a contractor, and give him a contract for a certain number of logs. As far as I can learn, the territory allotted to a jobber in the past has been much too large for the quantity of logs that his contract calls for. As a natural consequence this jobber, who has only one aim, viz.: to make money out of his contract, picks out the easiest spots in his territory, and no matter whether there are some large fine spruce logs in his territory that should be cut, but which would cost him a trifle more to get out, he will leave these standing. The following year, therefore, when a contract is let in the same territory a higher price is demanded owing to the timber being scattered and only the hard places left to lumber in, and it usually ends up with the result that no contractor will go into this territory except at an exorbitant price, and it therefore falls to the lot of the pulp manufacturer to establish his own camps and get out the remaining available logs at a very high cost. This point I wish to emphasize more particularly, and that is, when a contract is let for a certain quantity of logs the area of territory should be limited, and so thoroughly explored that it can be cleared systematically of the logs that should be cut. As contractors for logs are more or less men of moderate means, and who, if a bad season sets in and a possible loss in fulfilling their contract stares them in the face, either fall far short of their contract or abandon it, it is therefore necessary for a pulp manufacturer, in order to be safe regarding his raw material, to establish some of his own camps which will get the logs out no matter what the set-backs are. It has been amply demonstrated that a camp, or camps, operated by a company cannot get logs out as cheaply as a jobber or contractor, at least in the province of Quebec where the timber is scattered and the country very mountainous, but the results obtained by operating camps direct are in the long run very much more beneficial than from contractors. The Laurentide Pulp Co., as mentioned before, having such a large territory, and who require such an enormous quantity of pulp wood for the operation of their mills, have found it advisable to employ two inspectors, one for the jobbers or contractors and the other for its own camps. It is the duty of the former inspector to inspect regularly and frequently all jobbers' camps, and to see that these jobbers do not waste the timber nor break the government regulations. He also sees that all logs are stamped and properly culled, and when he finds anything out of the way, he reports it direct to the management of the company. The

inspector of the camps acts in a similar capacity, but reports on the general conditions of the camps in addition to the above.

Another bad feature of giving contracts to jobbers for logs is, that it is usual to give a contract for a certain quantity of logs to be of a uniform length. Suppose, for example, that a contract has been let for 50,000 spruce logs 13 feet in length, seven inches at the small end and up. A contractor, if he cuts down a tree, will only make from this tree logs of 13 feet in length, and I have found from personal experience that a large proportion of these trees would permit of another log being cut from 8 to 10 feet in length, and still not be under 7 inches in diameter at the small end. This part of the tree is just as good for making pulp as anything else, but, as you know, the cost of handling and driving a small log is almost as great as a large log, and if a manufacturer only considers his immediate circumstances, and his immediate cost of raw material, he will not bother with these ends of a tree, but, if he considers the fact that his raw material is worth money, and that by leaving these ends of the trees in the woods he is simply throwing away a part of his assets, and in addition to this is enhancing the danger of forest fires, he will, even at a slight extra cost, have these taken to his mills with the larger logs. In the case of a company operating its own camps this should be done in any case. In the case of the logs being cut for export to the United States, these ends of trees are not considered of any value.

The next step in the cost of raw material is the handling and driving of these logs to the pulp mills, and this is a point I wish to emphasize very particularly. The cost of pulp is determined largely by the quantity produced, as the fixed charges of a pulp manufacturing concern are almost the same whether a larger or smaller quantity of pulp is manufactured. It therefore is apparent that a large pulp mill has an advantage over a smaller one, and this refers more particularly to the cost of handling and driving the logs to the mill. As you are all no doubt aware, it costs very little more to drive a larger quantity of logs than a smaller quantity, and therefore if a pulp manufacturer has a large quantity of logs to handle, it pays him to make permanent improvements on his streams, lakes and rivers so as to lessen the cost of driving operations as well as ensure the safety of the logs.

The cost of manufacturing pulp is determined largely by the cost of the raw material, viz.: pulp wood, and it is natural therefore for a pulp manufacturer to endeavour to obtain his supply of raw material at the very lowest possible cost. In doing this, however, it seems to me that in the past, at least, it has been done at the expense of his prime asset, viz.: his pulp wood limits, and he will find that each year his cost will grow greater; whereas by systematically getting a proportion of expensive wood each year with the cheap wood and eliminating all source of wastefulness in the cutting of logs, and by making improvements so as to lessen the expense of driving operations, he will in the long run make more money and be better off than the manufacturer who simply looks one year ahead.

The raw material, or pulp wood logs, having arrived at the booms in front of the mills, their conversion into pulp is an entirely different business from the logging operations. I do not intend to go into the details of manufacturing pulp wood into pulp, except to say that so far as the pulp wood is concerned, it should be as carefully watched as coal or any other article that costs money. I fear, however, that a great deal of waste is incurred in preparing the pulp wood for manufacturing. In the case of the Laurentide Pulp Co., we allow nothing to go to waste, and even if a block of wood should come along with a certain amount of rot in it, instead, as is the usual custom, of using it for fire wood, the rot or imperfections in the wood are extracted and the balance used for manufacturing pulp. In Canada there are more mills manufacturing mechanical pulp than anything else, and as this is a comparatively easy matter and requiring less capital, it is bound to grow considerably. The manufacture of chemical pulp is very much more intricate, entailing more expert labour, and therefore has not grown to the extent of mechanical pulp mills.

As stated previously, the manufacture of pulp is only a step in the manufacture of paper, and the object of my paper is more for the purpose of showing what Canada is losing by not manufacturing this pulp into the finished product of paper than anything else. As an example of what this means to Canada, we will commence with a cord of

wood. We will say, for convenience sake, that a cord of wood is worth $3.50. When this is exported out of the country all the benefit Canada derives from it is the amount of labour expended in cutting this cord of wood, and the stumpage, if any, which is paid the government. By converting this cord of wood into mechanical or ground wood pulp, it means an expenditure in Canada of at least $7 per cord for both labour and material, and all of which can be obtained and produced by Canada. By converting a cord of wood into chemical or sulphite pulp, it means that an expenditure of at least $15 per cord is made for both material and labour. All of this, with the exception of the sulphur, which has to be imported from Sicily, can be produced in Canada. In the conversion of these pulps into paper, it means that a cord of wood, originally costing $3.50, is manufactured into a finished product worth about $40 per cord all of which is for material and labour, the most of which could be produced and manufactured in Canada if the business were sufficiently large. At the present time there are over one million cords of pulp wood exported into the United States annually, worth, we will say, for convenience sake, three and a half to four million dollars. If this quantity of one million cords of pulp wood was converted into pulp and then into paper in Canada, it would mean that an expenditure for labour and material in Canada would take place of over thirty millions of dollars annually. For the manufacture of this large quantity of pulp and paper it would require, however, several times this amount for permanent investments in the limits, water power, mills and machinery, and this in itself would mean a huge thing for Canada.

It therefore seems to me that the principal question before the Dominion and Provincial governments is, first, how to accomplish the manufacture of this large quantity of paper in Canada, and secondly how to dispose of it after it is manufactured. At the present time the United States exact a duty of $1.67 per ton for mechanical, or ground wood pulp, and $3.33 per ton for chemical, or sulphite pulp, and have a duty on newspaper that is prohibitive. The effect of this policy is apparent on the surface, as it provides the manufacturers in the United States with their raw material in a partly manufactured state at a low cost, and prohibits the competition of foreign paper. In addition to this, Canada seems to be the ally and friend of the United States manufacturers, as it allows them to come into Canada and procure their raw material, in the shape of pulp wood, with little, if any charge, and the United States Government allow it to enter into the United States free of any duty. The effect of this policy on Canadian manufacturers is, to say the least, very unfair. The Canadian manufacturer of both kinds of pulp has to compete with the American manufacturers of both kinds of pulp at a disadvantage by the amount of the duty imposed by the United States government on the pulp. This competition at certain times has been ruinous to the Canadian manufacturer. As an example, during the summer of 1901 the paper market was very dull, and as a consequence, the amount of pulp consumed by paper manufacturers diminished considerably. The over-production of pulp in Canada and the United States was very large, and the prices dropped until they reached a point where a loss was incurred. The over-production was caused *absolutely* by the American pulp mills that procured their supply of pulp wood from Canada, and as a consequence, owing to the protective duty the United States pulp manufacturers had, the Canadian pulp manufacturers were obliged to curtail their manufacturing operations until such time as prices reasserted themselves. This state of affairs would not have happened had not Canada allowed her pulp wood to go out of the country for a mere song. As I mentioned before, the over-production of pulp was caused by the pulp manufacturers in the United States who procured their supply of wood in Canada. If these mills had been out of the market, it would not have been necessary for Canadian manufacturers to have curtailed their operations last summer. It is true, people say Canada has the world for its markets in pulp and paper, but I am afraid too many people hazard this opinion without giving it the consideration it demands. In England, where our principal market at present for both pulp and paper lies, we have the serious competition of Norway and Sweden, and it is no mean competition. Whilst I do not believe that either Norway or Sweden have as good wood for manufacturing pulp or paper as Canada has, still they have many advantages that we have not, and as a consequence, they are able

to sell their pulp and paper in England at a very low cost, which Canada is obliged to meet in order to procure business.

It certainly seems absurd that Canada should allow her pulp wood to be exported from the country for a very slight charge, and that the American manufacturers, who use this wood, do not have any competition in the finished product—Paper, from Canada in the United States,—but when Canada exports her paper to England or any other foreign country, she not only has to compete against paper and pulp manufactured in Norway and Sweden, but also comes into competition with paper and pulp manufactured in the United States, from Canadian wood obtained from Canada almost for nothing. In addition to all this, the Canadian manufacturer to-day labours under great difficulties. He has to import from the United States the greater portion of his machinery and the clothing of his paper machines,—consisting of felts and wires,—which amount to many thousand dollars a year; he has to use coal that is protected by the Canadian government to the extent of 60c. per ton; he has to import his china clay from England, and the best grindstones also from the same place; he has to bring his sulphur from Sicily and his chemicals from various countries of the world; he has to employ his expert labour from the United States, and which is controlled by a union which curtails the production, and which union while enforcing this rigidly on Canadian manufacturers, makes exceptions in the United States. We are also handicapped in our export trade during the winter months by the long haul to our winter ports.

In conversation with a capitalist in New York two or three weeks ago, and who is largely interested in Canadian timber limits, I used the argument that if Canada prohibited the exportation of pulp wood until such time as the American government abolished or diminished its duty on pulp and paper, the American manufacturers would in a very short while remove their mills to Canada. This gentleman, after arguing this point for a long time said: 'I believe that what you say is correct, but I cannot under-'stand why you, representing a large manufacturing concern, should wish to make this 'fact prominent, as it would only invite competition for the company you represent.' My answer to this was, that we would prefer all the competition that would take place, and having the United States market open to us, rather than have less competition and our present markets. In conversation with another United States manufacturer within the last few days, he made the same statement, and from my own personal knowledge, I feel quite certain that it would not be long before a certain proportion of the United States manufacturers would be obliged to remove their mills to Canada if they wished to compete with Canadian manufacturers when the United States market was open to them.

It is true that the United States is not wholly dependent upon Canada for its supply of pulp wood, as is evident from ex-Governor Powers' remarks at the paper trade banquet in New York two or three weeks ago. Ex-Governor Powers made the statement that in Maine alone they had 12,000 square miles of territory containing 500,000,000 feet of spruce, and which in his judgment, if properly handled, would be an inexhaustible supply for American manufacturers. I do not agree with ex-Governor Powers in this statement, as 500,000,000 feet of spruce is a mere bagatelle to United States manufacturers of pulp and paper.

In addition to this, the Canadian government saw fit a short while ago to reduce the duty on newspaper entering into Canada. The Canadian market is so small that this only interferes with the smaller mills, who are dependent on the Canadian trade for their existence; but it certainly seems unfair that the Canadian government should do this, as it will enable the United States paper mills, when their production is greater than the demand, to dump their surplus in Canada. As long as the United States have a prohibitive duty on paper, Canada should do the same; but an abolishment of both would be the best.

I ask you also why is it that American capitalists have to-day invested in Canadian timber limits and Canadian water powers without developing the powers and cutting the limits? Why is it, I say, but to prepare for the time when Canada will come to her senses and they will be obliged to manufacture in Canada, or otherwise get out of business? These men are not short-sighted, and although they did secure a promise from the Quebec government that no extra stumpage over and above 25c. per cord would be

charged by them for the next ten years, they still feel that it is necessary to look further ahead than this. I ask you also why it is that the Quebec government a short while ago raised the stumpage on pulp wood cut from Crown timber limits for export into the United States to $1.90 per cord, thus giving a preference to the Canadian manufacturer of $1.50 per cord? Why is it that they reduced this to 65c. per cord, thus reducing the preference in favour of Canadian manufacturers to 25c. per cord? Would it not be better for the Quebec government, instead of selling its timber limits with a guarantee of this kind, to assist in building up Canadian manufactures of pulp and paper, and which would necessitate their purchasing further timber limits from the Quebec government, and in the development of these the stumpage to the Quebec government would increase and be a regular source of revenue, rather than to continue its present policy?

The Laurentide Pulp Company to-day manufacture about 100 tons of paper and cardboard per day, 125 tons of ground wood pulp per day, 70 tons of sulphite pulp per day, and cut ten or fifteen million feet of pine lumber each year. To do this it has required an investment of nearly four millions of dollars, the annual payment in wages of about one million dollars, and as a result of this the town of Grand'Mère, wholly and absolutely dependent upon the Laurentide Pulp Company, has sprung into existence, and to-day has a population of close on to 5,000. In addition to this, the villages adjacent to Grand'Mère have all grown, and the rural population in the vicinity of Grand'Mère is thriving and doing well. Canada could have twenty mills such as these in a short time if she would come to her senses and adopt the proper policy. Would it not be better for Canadians to have a permanent advancement of this kind, even though it did take a few years to obtain?

Possibly the question might arise as to the Canadian farmers who dispose of their pulp wood at the present time. These farmers would have a better market, with just as good prices as they have at present, if their purchasers were Canadian manufacturers instead of American manufacturers. Whilst on this subject, I might make mention of the fact that the so-called farmers of Canada who dispose of their pulp wood to American manufacturers do not deserve all the sympathy and support that one would think. In our own district I know several instances where these men obtained lots from the government presumably for settling purposes, but who, when the timber was cleared off, obtained another lot in somebody else's name. These men are doing more to damage Canadian forestry than any one else, and it is the duty of the present government to give this special attention and to see that it is stopped as soon as possible.

Canada has an opportunity to-day to show her wisdom and her foresight. If the government would take up this question as seriously and as vigorously as the Department of Public Works has taken up the question of harbour and river improvements, we might hope in the near future to see the paper industry of the world centred in Canada. At present Canada is floundering in the dark, and her wideawake competitors are taking advantage of this. Nothing in this world is gained without a struggle, and a struggle cannot take place unless the parties are determined. Canada should be determined to get the most out of her timber assets, and should not fear to take a decided step in this connection. I do not say it would be a wise thing for Canada to always have an export duty on her pulp wood, but I do say that there should be a sufficiently high export duty on pulp wood so as to make it practically prohibitive until such time as the United States government open their market for the finished product to Canadian manufacturers. This is only fair and just, and I cannot see why any hesitation should take place in adopting it. Canada has an opportunity now which should be taken advantage of. If she does not do so quickly it simply means that she is not only losing an opportunity, but is losing time that cannot be recalled.

I trust, Mr. Chairman and gentlemen, that I have not intruded on your time too long, and that I have not deviated from the subject of my paper too much. Your association would be many times more valuable to Canada's interests than it is, if the development of its forests was done by Canadian manufacturers, and the material taken from your forests manufactured into the finished product in Canada rather than as it is at present.

I thank you one and all for your very kind attention.

The CHAIRMAN—We shall be glad to hear any remark on this very excellent paper, a paper which has evidently received the greatest care in preparation from the standpoint of the manufacturer of pulp and paper in this country. It is a very important industry, and it is worth while spending a little time in discussing the question.

Mr. GEORGE JOHNSON—I took occasion some months ago to send out circulars, to all the pulp manufacturers in Canada, among them to the great company at Grand Mère. I sent out circulars to thirty-five pulp mills, some of them not yet in operation, such as the Belleville-Canadian, and the result of my circular I might read as a supplement to Mr. McGibbon's paper.

CANADA.

PULP MILL STATISTICS DECEMBER 31, 1901.

The pulp mills in Canada actually in operation have a capacity of 387,000 tons a year, of which 204,000 tons is mechanical pulp, 17,750 tons soda pulp, and 160,000 tons sulphite.

Their output last year was 264,600 tons, or about 70 per cent of their capacity.

The export of wood pulp in 1901 was valued at $2,003,120, of which $982,142 was shipped to Great Britain; $968,007 to the United States, and $51,972 to other countries.

Great Britain took, according to her accounts, a total of 504,400 tons of wood pulp, valued at $11,742,455. Of this quantity Canada supplied 78,817 tons, valued at $1,518,808.

Norway supplied 280,600 tons, valued at $5,122,629. Sweden, 116,400 tons, valued at $4,013,000, other countries supplying the remainder.

If all the mills in Canada, built and running and those under construction, were running at their full capacity they could not supply the demand of great Britain alone for wood pulp.

There is also a large demand in the United States for wood pulp. Besides the supply provided from within its own borders and from pulp wood imported from Canada (which latter amounted in 1901 to $1,288,817) the United States imported 51,207 tons of wood pulp, valued at $1,635,000, from other countries, principally from Canada, nearly 79 per cent of the whole quantity imported by the United States being from Canada. These two countries took nearly 56 per cent of the whole make of Canada. About 40 per cent is required for home purposes.

The customs returns of Canada, the United Kingdom and the United States do not call for a division of wood pulp into the three sorts known to the trade—soda, sulphite and mechanical, and those of Canada do not call for quantities.

It is, therefore, impossible to separate the several branches so as to ascertain the quantities of each of the three kinds we export—a point of considerable importance on account of the great difference in their value.

The business of Canada with the United Kingdom shows considerable development.

In 1899 we sent 6·5 per cent of the total value of wood pulp imported by Great Britain from all countries. This increased in 1900 to 9·4 per cent and in 1901 to 13 per cent.

The point I wish to make of practical importance is the advisability of this Forestry Association calling the attention of the customs authorities here and in England—and we can do it with the United States as well—to the necessity of separating the three kinds, so that we will be able to get sufficient material for a minute analysis of the whole subject.

The CHAIRMAN—Before going into a discussion of this paper of Mr. McGibbon's, we might hear the other two papers, which are practically in the same line, and discuss

the three together. It will save time. Mr. McGibbon's paper requires a good deal of attention, and the others when read can be discussed at the same time with the remarks which Mr. Johnson has just made.

Dr. FLETCHER—The present paper, by Mr. Austin Cary, was put in my hands by Mr. Campbell, thinking it was a paper dealing to some extent with injurious insects of the forests. Although it refers to that matter as of very great importance, there is nothing which requires elucidation that is not already treated by Mr. Cary in his paper.

THE MANAGEMENT OF PULPWOOD FORESTS.

AUSTIN CARY, *Forester for the Berlin Mills Company*, of Brunswick, Me.

I have received here the programme of your meeting, note that you have put my name down on it, and it is therefore with more than the strong regret I feel at the loss involved to myself that I have to tell you I cannot attend. Neither have I opportunity to write an extended paper. The best I can do is to tell you very briefly of the methods of control of lands and logging practised by the concern in which I am employed, and indicate what has been our experience in the way of conservative cutting.

But first I wish to put you and any others who may have control of spruce woods on your guard against a beetle which destroys spruce timber by boring round in the inner bark of the trees, so girdling them. It is this insect apparently which has destroyed large quantities of spruce timber in Maine and New Hampshire at different times in the last thirty years; it is now doing considerable damage in the Androscoggin basin and on neighbouring lands in both states, and I have myself traced it at several points across the boundary into Canada. This beetle, Dendroctonus by name, has been under observation in our forests for the last four years, and it has also been studied by an expert entomologist. From all we can learn, it is by far the most formidable enemy that spruce has to dread in this country. Formidable it certainly is here. In my opinion it has destroyed half a million dollars worth of stumpage in the last ten years. You may have observed it in Canada. If not I feel sure that its ravages must have been overlooked, and that careful examination of your lands will disclose it.

I will not say more of this matter, but will refer those interested to the literature sent, and particularly to the box of specimens shipped you by express from Rangely.

As for conservative cutting of spruce woods, I will say first and most emphatically that we find it a difficult and risky process, one that is likely to bring more loss than gain unless done with great care and considerable skill. It may be different in other countries, but that is the case here. Our timber is typically large and tall; much of it stands in exposed situations, on ridges and mountains; much is on extremely rocky land. The winds are continually damaging our native uncut stands and the thinning of woods in all such places as above is either entirely impracticable or must be done with the greatest caution to ensure that what is left standing will not blow down.

As said already the danger from wind might be much less in another country. In this very region indeed considerable light cutting was done in decades past without incurring great proportional loss. That, however, was different work from what is required now. Not more than a third or half the timber was taken then and that in bunches, the biggest and best, leaving the thin strips and the rough and steep places entirely untouched. At the present time business conditions are far different. A stick of spruce or fir scaling only 20 feet B.M. is merchantable, and has stumpage value if it is not too far away from other stuff. We are logging a good deal of rough, difficult land with oftentimes a long and costly road built into it, so that a heavy cut may be necessary to pay the bills. At any rate owners through this region expect that on any land logged over three-fourths of the stand shall be taken, and to take three-fourths of the merchantable timber from most of our lands, leaving the balance at the same time in such shape that it can be depended on to stand and grow is, as I have indicated above, a very hazardous undertaking.

My experience in the actual handling of spruce lands covers four years. According to my observation a logging boss trained to hard cutting when told that we wish to cut conservatively is pretty sure to leave what he does leave not in the shape of small growth so much as in strips of scattering timber and odd corners on rough and difficult ground. This makes the logging show up cheaper, but it may be on the other hand that what is left standing is the very stuff that most needs cutting of any on the land. In other words as a first result instead of thinning or conservative cutting we are apt to get simply slack cutting.

When this has been corrected and the man gets a better notion of what we are about, his next move is to leave the small growth uniformly all over the land. This may do in some countries, but it means loss here. Tall and slender trees left too open, anything less than a full stand on divides and knolls, tall timber shoally rooted on rocky land, these items together may amount to a good deal in a logging job and all of them are such that sooner or later they are sure to blow down. With us the day of reckoning came in December, 1900. Two gales came that month before the ground had frozen, one of them after a soaking rain. The loss suffered was not in cut over lands alone, but of course it was more remarked and regretted there. Some of the down stuff we have picked up since at added expense. Some of it is so scattered that it is impossible to get it.

Something of that however was to be expected. We have not been discouraged, but have simply inferred that we must be more careful and exercise closer control of the work. We learned something ourselves by experience and in the course of time we came to have a better understanding with the men. For the last 2 years I think we have been doing fairly well. Considerable merchantable stuff has been left to grow and for the most part I feel pretty confident about it. The key to success is variation of the cutting according to the stand and the lay of the land. The critical matter, the thing which must be continually thought about, is the safety of what is left from wind. Mixed growth, growth that is to say in which hard woods compose half or thereabouts of the total stand, can generally be thinned with safety and comparative ease. Elsewhere great care has to be exercised, and there is a great deal in picking strips and bunches to be left entire. This we frequently do with areas of smaller-sized thrifty growth if there is no dead, falling or down stuff in them. Lastly we do not hesitate, when we think that is the proper thing to do, to cut clean.

There is one side issue that perhaps should be elucidated here, and that is the form of contract under which work of this nature is secured from contractors. The Berlin Mills Co. owns several hundred horses and does its own logging largely, but a portion of its work is done by jobbers cutting by the thousand, and strange as it may seem these men do their work as well and are fully as amenable to control as the company's own men. They have always cut quite as economically as the others—in respect to stumps, tops, picking up windfalls, dead timber, &c.—and I think we are securing from them now quite as good work in this other line.

The clause in our contracts which covers this feature of the business is as follows :—'Spruce and fir timber shall be cut to the size of 12 inches on the stump, but this rule may be varied by the Berlin Mills Co. with a view to leaving the land in good growing condition.' This form of contract is not recommended as a solution of all difficulties and a guarantee of success. It does not replace supervision, but distinctly implies it. These men might understand its terms differently and get at loggerheads with one another before they had been at work a month. But this form of contract does allow latitude and adaptation to the country, and in two of our concerns the past winter it has worked very well. The men in charge are active, capable men who were anxious, too, to do the work as well as they could. I have endeavoured to be reasonable myself, and we had worked together before so we understood one another. I have spent a couple of days in each concern every three or four weeks, examining all the work done, and looking over the timber ahead to see how it should be handled. In this way we have come through the winter so far with very little friction, and the work I feel is being done substantially according to the company's interest, as near probably as it would be done by any of its own men.

One favourable condition I should not fail to mention here is the long established reputation of the company for fair dealing, and the certainty the contractors have in

consequence that they will not be subjected to any underhanded tricks. As to the volume of cutting that one man can look after in the fashion outlined above, I will say that seven camps have been under my oversight the past winter scattered over a round trip by tote road of 150 miles. The aggregate cut is about 18 millions. Even if a man has no care of supplies, that is enough to have under his control.

It seems to me quite likely that what I have written may hit entirely aside the mark as far as relates to Canadian conditions. Spruce timber with us is a commodity in strong demand. Stumpage is worth $2 to $4 a thousand according to location, very small sticks have value, and great economy and care in cutting are consequently demanded, financially speaking. Some might think we had secured this. I do not think, however, that we yet do our work as carefully as the value of timber, present and prospective, warrants. In fact, it seems to me we ought largely to remodel our organization.

In Canada, on the other hand, I suppose your main problems relate to great tracts of natural forest which you are only beginning to log, and on which stumpage sells at a low rate. In respect to such a situation, the most that occurs to me to suggest is close study of the health and condition of the timber.

Spruce woods contain trees of every age, the young coming on to replace the old when the latter fails, and it is natural to suppose that the replacing process is constant, that growth and decay on a tract year after year balance one another.

As a matter of fact, according to my observation, that is not the case. The history of a tract is more often a wave motion, with a considerable difference oftentimes between the trough and the crest. That is to say, for a period of years a valley or a township of virgin timber land will be healthy and thrifty, gaining all the time, without much loss from old age or any other cause. Then will come a turning point, when things begin to go the other way. A big gale perhaps will start it, for some stands when once a break has been made in them keep on going down year after year. Insects oftentimes bear a large part in the destruction, and fungi no doubt do the same. But whatever the active agent, over-maturity of the timber is the great predisposing cause. It is no unusual thing for tracts to lose in this way in the course of a few years a quarter, half or even a larger proportion of their value.

Now it is evident that if this is the case, economical handling of large bodies of timber land must take this matter clearly into account. Very likely you in Canada are fully alive to all these matters. I hope you are; but I know that on this side the boundary they have been mainly overlooked by explorers and neglected by business men. Men have cut where they could get logs cheapest without considering anything else. Whole townships have died down and owners have hardly been aware of it. On one tract belonging to my own concern I can show where probably $50,000 worth of stumpage on very accessible land was destroyed, and there was no realizing sense of it till two years ago.

Looking after and controlling these things is one of the most profitable fields of work for well trained men in public or private employ. I believe I am the first man calling himself a forester to be employed regularly by an American business firm. It is in this field that I feel surest that the measure has been justified. My work outside the logging season has been the survey and exploration of the lands as a basis for their operation. Topographical maps and models result from this, also sheets descriptive of the timber. As far as may be, the logging jobs are located on the territories that most need cutting, and we are careful while there to take all the defective but still usable timber. The tracts are kept under watch too, and no big blow down can occur, nor bug work get much of a start without our being aware of it.

What has been lately written gives a clue to the motive for conservative cutting as we practise it. We have not settled down to the European idea of sustained yield, of running a business of a certain volume for ever from a given tract of land. Whatever has been said, I do not believe that any business concern in the United States, knowing what it means, has settled on that. The reason is that we have large tracts of timber that badly need cutting, and the sooner we can get over them, saving the dead and declining stuff and putting them in shape to grow, the better it will be. This is the chief motive and, balanced by considerations of cost and practicability, is the key to our operations along this line. Of course, expected growth is a consideration as far as it is not

offset by windfall. Then we believe that in the future better stumpage can be had on the smaller classes of timber. But certain of its tracts the Berlin Mills Company cuts as closely as any one can cut, and if ever in the future the question comes up whether to shrink the volume of manufacture or to maintain it for a time longer by cutting the lands down to the lowest practicable point, that will be a new question to decide. Speaking for myself and as a forester, I feel like felicitating you Canadians on having retained so much of the timber land of Canada under government control.

Dr. FLETCHER—The specimens sent by Mr. Cary illustrate the manner in which destructive insects operate in the spruce and pine forests. The first is the bark beetle, which attacks trees after they are injured by fire or bruises, or put under conditions not most advantageous to them. For instance, the spruce trees in a thick grove are seldom injured by these insects, but once there is an opening made, they attack the trees, and the yellowing of the leaves is the first indication of their operation. In New Brunswick large areas first showed a yellowish tinge, and then a rusty, and it was found that the beetle was at work in apparently healthy trees. They were apparently, but not actually, healthy. The first indication that something is wrong with the spruce tree is the presence of the spruce bark beetle beneath the bark. Another specimen shows the work of another beetle which operates in the same way, but with the difference that there is a mating chamber where the eggs are laid. The bark beetles work not only in the bark, but immediately under it. There is another beetle which eats a hole into the wood and in that burrow cultivates mushrooms, on which it feeds. The habit has only been found out recently, though the insect has been known for years. The discoloration of the wood in this specimen shows that the holes have been used for a long time, probably a year. There is a borer, the round-headed borer, which sinks its burrows right into the wood, and the grub bores into the heart of the tree. The two large borers, the long-horned borers, directly the tree is injured by fire or by abrasion of the bark, lay their eggs in the opening and the grub hatches and for a few months feeds under the bark. Later it bores into the heart of the tree, and by the next spring it has gone through a big pine tree three or four feet in diameter. It comes out in the spring at the breeding season, and the same process is repeated. There is a hymenopterous insect, belonging to the same family as the bees and wasps, which destroys these beetles. There is also a small insect with two white stripes which destroys the timber. I have mentioned the small bark beetle which is so very numerous in New Brunswick and the province of Quebec. The usual treatment is to cut the timber as soon as it is found to be affected. Much of it could be saved that way, but it frequently means a large expenditure. Some years ago in the Upper Ottawa timber limits, after a fire, it became necessary for our lumbermen to cut a great deal of timber in a year in which they would rather not have done so, but it was the best policy, because if they had left it until the next winter it would have been destroyed. I find in the pamphlets sent by Mr. Cary reference made to the saving of tracts of timber in that way. By knowing the nature of those insects, and what their habits are, the danger of leaving timber that has been attacked is understood better, and great saving may be made by knowing that it is not safe to leave the timber over the winter. In the case I mention, our Ottawa lumbermen cut a great deal of timber that otherwise they would have left, and had they not done so, there would have been an enormous loss, because the borers would have destroyed, or greatly diminished, the value of the timber.

The CHAIRMAN—Before proceeding to a further discussion of those papers, I would call upon Mr. Joly to read his paper, and then the three papers can be discussed together.

THE DANGER THREATENING THE CROWN LANDS FORESTS OF THE PROVINCE OF QUEBEC THROUGH THE CUTTING OF PULP WOOD AS AT PRESENT SANCTIONED BY THE REGULATIONS CONCERNING 'WOODS AND FORESTS.'

By E. G. JOLY DE LOTBINIÈRE, Quebec, P.Q.

MR. CHAIRMAN AND GENTLEMEN,—I feel convinced that all those who have given the subject serious consideration will agree with me that the manufacture of pulp wood on our Crown Lands, as at present sanctioned by the Regulations concerning Woods and Forests, constitutes a serious menace to the continuous supply of timber from that source.

It is also a matter of notoriety that the revenue derived from our Crown Lands is by far the most valuable of our provincial assets, and consequently, all those who have at heart the prosperity and welfare of our province, should unite their efforts towards securing such legislation as will safeguard our most important heritage, and so secure for future generations the same advantages we now enjoy.

The great and steadily growing expansion of the pulpwood industry renders it imperative to draw public attention to the condition of things which now prevails in the province, in so far as pulp wood making on the Crown Lands is concerned.

Let me assure my hearers that I fully recognize the importance of this great industry to the province. We have an enormous supply of the raw material on our Crown Lands, and it is but right that it should be turned to profit, but, in doing so, should not every possible care that science and experience can dictate be taken to preserve our forests for future generations, for whom we but hold them in trust.

When one takes into consideration the enormous area of forest land destroyed every year by fire, the extensive and much to be deplored waste of forest land, absolutely unfit for cultivation, which is going on under the specious pretext of colonization, as well as the inroads of the lumbermen, doubly dangerous nowadays, when the manufacture of pulp wood has given him an incentive to cut timber which a few years ago would not have paid the cost of production, it is manifestly our duty to give the subject of 'forest preservation' our most serious consideration, and not allow ourselves to be lulled into fancied security as to the inexhaustible condition of our forest wealth.

And now comes the question: Do the existing Rules and Regulations affecting 'Woods and Forests,' of the Department of Lands, Mines and Fisheries of the province of Quebec afford such necessary protection to our forest lands as will guarantee, for the future, a continuous and inexhaustible supply of timber fit for pulpwood.

In my humble estimation they do not, for I consider that license holders are permitted to cut spruce and other timber fit for pulpwood at too low a standard.

Denuded or depleted tracts of forest land can be restored in two ways, either by 'artificial reforestation' or 'natural renewal.' I do not propose to deal with the first method, though it is of vital importance at the present moment in certain treeless sections of the country, such as, for instance, the prairie lands of Manitoba and the Northwest Territories and no doubt in many sections nearer home. It is gratifying to see that the Federal government appreciates this fact, and that the Department of the Interior is prepared to assist farmers and others residing in the above sections in the growing of forest plantations and shelter belts. One notices with pleasure that the local government has also taken the matter up, and that it offers certain inducements to proprietors and those in possession of land, to encourage them to utilize the unproductive portions of their properties, by planting forest trees. The day will come, and perhaps sooner than we expect, when 'artificial reforestation' will have to be resorted to on our Crown Lands, but, for the present, 'natural renewal,' if nature is only permitted to do her work, should be sufficient to ensure us a lasting supply of timber for all purposes.

Now to assist 'natural renewal,' to allow nature to repair the ravages of man, what is necessary?

The answer to me seems evident.

Stringent regulations should be made and strictly enforced by the Department of Crown Lands, so that a sufficient crop of young timber of proper dimensions be left on a tract, to replace that which has been removed, and sufficient time should be given such timber to attain a proper growth before the limit holder be permitted to take off a new crop.

Now what are our Crown Land Regulations as to the cutting of white spruce and other timber fit for pulp wood?

Paragraph 12 of the Regulations concerning 'Woods and Forests' for the province of Quebec is as follows:—

'Licentiates are forbidden to cut on Crown Lands pine trees measuring less than 12 inches in diameter; spruce trees less than 11 inches in diameter; and trees of other descriptions measuring less than 9 inches at the stump; but they are permitted to cut black spruce, balsam, poplar, hemlock and other small timber intended for the manufacture of paper pulp at a diameter of 7 inches at the stump.'

The idea is generally prevalent that a tract of timber land, denuded of timber, such as license holders are allowed to cut, renews itself naturally in from 15 to 20 years at the outside.

Let us for instance take a tract of land where all the white spruce has been cut at 11 inches on the stump (such a tract, where pulp wood making has been going on would, I fancy, be hard to find, for I question whether the lumberman pays much attention to the diameter restriction in such a case) the tamarack, black spruce, aspen, hemlock and balsam at 7 inches on the stump. We will, however, suppose that what remains of the above mentioned varieties average, for the white spruce, 10 inches and less, tamarack, black spruce, aspen, hemlock and balsam 6 inches and less, now, would this tract under the best of conditions be able to stand another crop in 15 or 20 years, if spared by fire and wind?

Professor Fernow, at one time Chief of the Bureau of Forestry at Washington, and now Director of the New York State College of Forestry, whose opinion carries the greatest weight, gives me his views on this question, as follows:

'The idea of "renewal" in 15 to 20 years, where the cut is down to 7 inches, is ridiculous. What is meant is, that after 15 or 20 years some and enough of the left over trees will have attained a diameter which it pays to cut. This was perhaps true under some conditions, when the diameter to which the cut was made did not go below 12 inches, but even then it was not renewal. It stands to reason where spruce is culled and hard wood left, it is hard wood that renews and not spruce. Your government, having control of the forest, should certainly limit the diameter to which trees may be cut, but the size must be variable according to local conditions, for even 9 inch trees would not stand up under the winds, if left standing singly without the support of neighbours. The time is ripe for something better than diameter restrictions.'

It is, of course, a well-known fact that where a crowded stand of timber has been judiciously thinned, the trees that remain grow more rapidly than they did before; as the survivors have a greater amount of nourishing material at their disposal; the sun's rays reach the smaller timber; the circulation of the air is better, and the tree has more room to spread its roots and branches; consequently, trees in a virgin forest are of slower growth than those on tracts that have been cut over with discrimination.

Henry S. Graves, in his work on 'Practical Forestry in the Adirondacks,' has come to the conclusion, after most careful study and investigation, that it takes an average of nine years for spruce to grow one inch in diameter on lands that have not been cut over, and seven for timber on 'cut over' lands.

No hard and fast rule can be laid down for the growth of spruce in our province, as our forests cover such a vast area that the conditions of soil, site and climate are necessarily most varied. As a natural result, the growth of timber cannot be absolutely uniform in all sections.

The differences in the rates of growth, however, are not likely to be such that a fair general estimate may not be arrived at by selecting a centre for one's observations where

spruce is generally conceded to thrive well. I consider the seigniory of Lotbinière such a centre and my observations have been made there. The fact that we have steadily cut spruce on this property for the last half century, and that we hope to continue doing so for many years to come (with due regard to the principles of 'natural renewal') should be accepted as a proof that I have selected a favourable section of country for my observations.

I lately measured 100 white spruce (*Abies alba*) in order to find the number of years required to grow one inch with the following results :—

1	grew 1 inch	in 4	years.	23	grew 1 inch	in 9	years.
1	"	5	"	18	"	10	"
8	"	6	"	8	"	11	"
12	"	7	"	4	"	12	"
24	"	8	"	1	"	13	"

The average rate of growth of these 100 trees to gain 1 inch diameter would therefore be 8 years.

Leaving average growth aside and taking individual growths, it would follow from the above, that on a tract from which all the 11 inch spruce had been removed, a tree 10 inches on the stump, growing 1 inch in 6 years would take 18 years to attain 13 inches diameter.

One growing 1 inch	in 7	years	would take	21	years.
" "	8	"		24	"
" "	9	"		27	"
" "	10	"		30	"
" "	11	"		33	"
" "	12	"		36	"
" "	13	"		39	"

Taking for granted that the above statements as to the growth of spruce are fairly correct, it will be readily admitted that the regulation allowing spruce to be cut at 11 inches on the stump is most hostile to the scheme of 'natural reforestation,' as at least 65 per cent of our spruce takes from 8 to 10 years to grow 1 inch in diameter.

The cutting of spruce should therefore be absolutely prohibited under 13 inches on the stump.

A spruce cut at 11 inches diameter on the stump, if converted into logs 12 feet long, would give two logs, the first having a diameter of 9 and in some cases 9½ inches at the small or culling end, the second a diameter of 7 inches. These two logs would together contain, according to the table of contents of saw logs, upon which the Crown Lands collect their dues, 52 feet B. M. A tree cut at 13 inches diameter on the stump, made into logs 12 feet long, would also give two logs, the first of 11, and the second of 9 to 9½ inches diameter, at the small end. These two logs, according to the tables I have already alluded to, would give together 84 feet B. M., or 32 feet more than the contents of a tree cut at 11 inches on the stump.

Logs 9 and 7 inches in diameter are hardly the kind a mill owner hankers after for sawing into deals and boards, and, as a result, a large percentage of this small timber is cut into pulpwood. On the other hand, a tree felled at 13 inches on the stump gives at least 1 fair sized log of 11, and a second of 9 inches. The 11 inch log is suited for deals and boards, and the 9 inch, should it pay better, can be converted into pulp wood. The benefit to our Crown Lands of a change in the felling diameter of spruce from 11 inches to 13 inches on the stump is so manifest that it is needless to insist any further on the subject.

Black Spruce (*Abies nigra*).—This tree, which is generally considered the most valuable for pulp and paper making, hardly ever attains a large size in the province of Quebec. A tree from 10 to 12 inches diameter on the stump is a rarity. Its growth is also very slow, taking an average of about 15 years to grow 1 inch in diameter. Under the circumstances, the diameter at which it may be felled, 7 inches, is not too low, were

it not for the difficulty, when piled and corded, of distinguishing white from black spruce, and, consequently, the opportunity afforded unscrupulous pulp wood makers to cut white spruce below the government's restriction of 11 inches.

TAMARACK (*Larix Americana*).—Under favourable conditions, that is, when found on slightly elevated ground and not in swamps, the growth of tamarack is about equal to that of white spruce, and the tree attains a very large size. When found in the vicinity of swamps and low damp soil, its growth is exceedingly slow, and the tree never attains a large size.

I have measured tamarack found on moderately elevated ground that grew as much as 1 inch in dia. in 6 years. The swamp tamarack takes from 20 to 24 years to grow 1 inch.

I regret to say, that as far as tamarack is concerned, the government might as well withdraw all diameter restrictions for this valuable wood (alas! that its commercial value was not appreciated sooner), in most sections of the province is now dead or dying, and is found in various stages of decay, due to the persistent ravages for many years past of the 'saw fly grub.'

Under the circumstances all tamarack which may yet be fit for any industrial or domestic purpose, should be made use of irrespective of any dia. restrictions.

HEMLOCK (*Abies Canadensis*).—It is generally conceded that hemlock, when properly and economically worked, is as valuable as white spruce. It is one of our few forest trees that can be thoroughly utilized, horns, hoof and hide. The bark commands as a rule, a high price; the boards and deals find a ready market at remunerative figures; ties are made from that part of the tree unfit for logs, and cordwood from log buttings whenever the rate of transport to the nearest market allows a margin of profit. And yet our Crown Lands Regulations allow the felling of this valuable timber at a diameter of 7 inches on the stump, classifying it (one of our largest forest growths) among the 'small timber' intended for the manufacture of paper pulp.

The measurement of 25 hemlock trees gave the following result:—

No. of trees.							
1	grew 1 inch in	7	years.	3	grew 1 inch in	12	years.
1	"	8	"	5	"	13	"
1	"	9	"	5	"	14	"
3	"	10	"	1	"	15	"
4	"	11	"	1	"	19	"

From the above measurements the average growth of hemlock would be 1 inch dia. in 12 years.

A 7 inch felling restriction for hemlock is ridiculous, as a tree at that diameter cannot yield sufficient bark to pay the peeling, let alone the handling, loading, freight and other expenses. The timber is not fit for logs or ties, and could only be utilized for pulp wood. The marketable value of this tree, when of sufficient size, at least 13 inches on the stump, entitles it to the same measure of protection as that which should be afforded white spruce.

BALSAM (*Abies balsamea*).—Among pulp woods balsam comes next in value to spruce. Under favourable conditions it takes from 5 to 7 years to gain 1 inch in dia. Notwithstanding its satisfactory growth, the cut should be limited to 9 inches on the stump. Were this wood only fit for pulp, measures should be taken to assure a continuous supply, by increasing the diameter at which it might be felled, but apart from its value for pulp manufacture, balsam logs, fit to be cut into boards, deals and other merchantable timber, command a price on the market equal to that of white spruce.

ASPEN AND POPLAR.—Aspen and poplar, under favourable conditions are of rapid growth and take but from 4 to 5 years to grow 1 inch in diameter. I measured an aspen, 24½ inches dia., which only took 55 years to attain this respectable size. Were it not for the damage resulting to contiguous growths by felling large timber and only leaving unprotected pole wood, which falls an easy victim to the winds, no great objec-

tion could be found to cutting aspen and poplar 7 inches on the stump, but for the protection afforded the young growth, aspen and poplar should not be cut at a smaller dia. than balsam, viz.: 9 inches.

The result of my investigations, such as they are, lead me to conclude that if we are to secure a continuous supply of pulpwood, and at the same time give our forests a proper measure of protection so as to permit of 'natural renewal,' paragraph 12 of the Regulations concerning 'Woods and Forests,' should be amended by prohibiting the felling of white spruce and hemlock under 13 inches and that of black spruce, balsam, aspen and poplar under 9 inches on the stump. Tamarack, whenever it is dead, dying or suffering from the ravages of the 'saw fly grub' should be cut irrespective of any diameter restrictions.

If, however, I am wrong in my views as to the time necessary for a forest to recover from the ravages caused by the ill-regulated cutting of pulp-wood, if a forest after 20 years can offer the lumberman a second crop of a remunerative nature, well, let us be thankful; but, on one point, which I now wish to mention, I confidently expect to have the support of all those who take an interest in the developments of our forest resources, and that is, 'the absolute prohibition of the export of pulpwood, in its raw or unmanufactured state.'

If nature has supplied us with a vast quantity of this valuable wood, infinitely more than we need, or may ever need, for our own use, by all means let us dispose of our surplus; but in doing so, let those who need it come to the province of Quebec to get it. Let them purchase their limits, erect their mills and manufacture the raw material here. Their millions should be spent on Canadian soil. By adopting such a policy, we will, at least, derive the largest possible benefit from the impoverishment of the provincial domain. We have a right as Canadians and inhabitants of the province of Quebec, to protest in every legitimate way open to us against the export of our pulp wood; nay, more, it is our duty to do so, and we should never rest satisfied until the manufacture of our raw material takes place on our own soil.

On January 18, 1900, the government woke up to the fact that measures should be taken to check the export of our pulpwood, and a charge of $1.90 per cord was imposed on all stuff destined for export. Had this wise provision been adhered to, foreign capital, to a very large extent, would have been already invested in the province and thousands of Canadians now earning a living in the United States would have returned to their homes with the assurance of finding constant and remunerative employment in their own country. But it was not to be. The government's wise and conservative policy was evidently regarded with disfavour by parties possessing large political influence. The welfare of the province had to give way to private interests, for on June 1, 1901, the charge was reduced from $1.90 to its present rate of 65c., which is hardly of a nature to discourage export.

Ontario has been far wiser than Quebec in the management of its pulp wood lands. In 1900, upon the report of the Honourable Commissioner of Crown Lands for Ontario, an Order in Council was passed absolutely prohibiting the export of pulp wood cut on the lands of the Crown. From the 30th day of April, 1900, every license or permit to cut spruce or other soft wood suitable for manufacturing pulp or paper on the Crown lands, was issued, subject to the condition that all such timber be manufactured in Canada, into merchantable pulp or paper, or into sawn lumber, woodenware, utensils, or other articles of commerce or merchandise, as distinguished from the said spruce or other timber in its raw or unmanufactured state.

As a result of this wise restriction, several large American companies have already taken up Crown pulp lands, and have spent vast sums in the erection and working of their mills.

The province of British Columbia has also been wise enough to insert the following clause in all timber leases of Crown lands:

'Provided further, that all timber cut from the said land must be manufactured within the confines of the province of British Columbia; otherwise the timber so cut may be seized and forfeited to the Crown, and the lease cancelled.'

Why should not Quebec be able to do what Ontario and British Columbia have done?

This question is one of importance, not only to the province of Quebec, but to the whole of Canada, and the earnest efforts of this association and of all those who take an interest in the prosperity of the country should be directed towards opening the eyes of our provincial government to the advantages which will accrue, not only to the Provincial exchequer, but also to the working and industrial classes at large, by the absolute prohibition of the export of our pulp wood in its unmanufactured state.

This much needed reform could be brought about by the insertion in all timber licenses and permits of a clause forbidding the export of pulp wood, or by raising the dues on wood for export to a practically prohibitive figure. Should the province of Quebec refuse to take action in the matter, pressure should be brought to bear on the federal government, to impose an export duty on the unmanufactured article of such a nature as would render the export impossible. Efforts, I am aware, have already been made in this direction, so far without success, but that is no reason why the agitation should not be continued and more earnestly than ever, until the desired end is secured.

I have translated into English a letter written by my father in 1894, on the pulp wood industry. My father at that time was completely opposed to the cutting of pulp wood on the Crown Lands. Since then his views have become somewhat modified, for the cutting of pulp wood on proper economic and scientific principles need not necessarily endanger the existence of a forest to any greater extent than would any other form of lumbering. May I be permitted to read a portion of this letter, which bears directly on the subject I have the honour to address you on to-night:

QUEBEC, November 17, 1894.

To ERNEST PACAUD, Esq.,
Proprietor of *l'Electeur*, Quebec.

MY DEAR SIR,—I have just read in yesterday's edition of *l'Electeur* an article on the pulpwood industry, in which you give extracts from a most interesting letter written by Mr. J. H. Lefebvre.

He speaks of the advantages which will accrue to the settlers from the establishment of pulp mills in the regions lately thrown open to colonization, as the settler now, when clearing lands, after taking off all timber fit for logs, is obliged, in order to prepare his land for cultivation, to burn all small spruce and balsam, whilst, should a pulp mill be in his vicinity, he could sell such timber, as pulpwood, at a profit.

I strongly approve this project, provided the lands thrown open to colonization, by the government are really fit for agriculture, and not as too often has been the case in the past, poor and sterile lands, whose value consists chiefly in the timber which they may produce, lands which settlers are compelled to abandon after having wasted on them, all to no purpose, the best and most precious years of their lives.

But what I really object to is that the government should allow the cutting of pulp wood on the Crown Lands. Our forests are our principal source of revenue, apart from the annual subsidy that the province receives from the federal government.

By destroying the young trees, which in a few years would replace the mature wood fit for log making, one condemns a forest to a speedy death, just as a nation would be swept out of existence if every child that was born was done away with whilst in its infancy.

If, at least, the country derived from this pulp wood all the profit that it should—were the pulp manufactured in Canada, it would be but half an evil, but the greater part being exported to the States, to be there converted into pulp, Canada not only loses the legitimate profit she should make by manufacturing it at home, but our working population, from lack of employment in Canada, has to go to the States to find work there in the American pulp manufactories and other branches of industry.

The provincial government appeared to appreciate this fact, when, this summer, an Order in Council was passed increasing the stumpage on pulp wood on Crown Lands when not manufactured in the province. Unhappily after a few weeks the government, giving way no doubt to the pressure brought to bear against it by the pulp wood exporters, cancelled this Order in Council.

If England, instead of working her own coal and iron mines that providence has so liberally endowed her with, had invited the nations of Europe to come and work them for her, and carry off the raw material to be used and manufactured in their own country, she would have acted with as much madness as Canada is now doing by permitting our neighbours to cut and carry away our forest wealth; to grow rich at our expense, manufacturing it at home, with the aid of our fellow-countrymen, who are obliged to exile themselves so as to find a living in a foreign land, &c., &c.

Believe me, sir,

Your devoted servant,

H. G. JOLY DE LOTBINIERE.

In conclusion I wish to draw the attention of this association to the thoroughly unreliable data furnished the public by the provincial government as to the quantity of pulp wood manufactured annually on the Crown Lands.

It would appear by the annual statement of spruce and pulp wood manufactured on Crown Lands that in

1895—213,237,200 ft. B.M. spruce were cut and 7,111$\frac{7}{10}$ cords pulp wood.
1896—270,156,800 ft. B.M. spruce were cut and 11,778$\frac{3}{4}$ cords pulp wood.
1897—276,482,200 ft. B.M. spruce were cut and 4,015 cords pulp wood.
1898—371,628,571 ft. B.M. spruce were cut and 4,451$\frac{1}{2}$ cords pulp wood.
1899—303,393,832 ft. B.M. spruce were cut and 3,806$\frac{3}{8}$ cords pulp wood.
1900—308,914,039 ft. B.M. spruce were cut and 6,926 cords pulp wood.

Now these returns are clearly erroneous, as far as pulp wood is concerned, and there is but one rational explanation of these misleading and insufficient statements.

The department evidently only keeps account of whatever timber is made into pulp wood on or near the spot where it was cut, piled and measured. All spruce and other wood destined for pulp, which is floated to the mills in logs, and there cut into pulp wood, is completely left out of its calculations. This condition of things should be remedied at once, for not only the Department of Lands and Forests, but the public as well, should be in a position to know how many cords of pulp wood are annually made on the Crown Lands, how many find their way to foreign markets, and how many are manufactured at home.

The government should take the necessary steps to oblige limit holders to declare what proportion of their cut was converted into pulp wood, what used at home and what exported. In no other way can a true and accurate account be kept of the annual cut of pulp wood on our Crown Lands.

The CHAIRMAN—The whole question of the three papers is open for discussion.

Mr. DRUMMOND—I think we can all congratulate ourselves that the papers read this afternoon have been eminently practical. Mr. Joly and Mr. McGibbon have brought before us one principle which I think should be of intense interest to us, and one which, it has occurred to me, has been neglected for many years. Of course, in the earlier days of the country, when there was very little capital here, it was possible to view without any anxiety the raw material going to the lake ports and over to the United States or being taken down to Montreal and Quebec, and exported to Great Britain. But it seems to me that day has gone by long ago. Here we have been adopting a policy for some years which has been apparently of great interest, of trying to get the back country opened up. For what purpose? To bring in raw material to pass through these towns. Bonuses are given to railways, and what is the result? If the raw material were brought to these towns to be manufactured, and the profit which we at present give to our neighbours on the other side remained with us, then there might be no objection. But these raw materials, pulp wood, and so on, were simply brought to a

frontier town, put on vessels and carried to the United States. Of course we boasted that this material was passing through these places, but what good did it do? It did no good, except the little handling putting it on board the ship. I have spoken against this time and again and it appears to me that we have been viewing the matter in a wrong way, but I am glad that Mr. Joly and Mr. McGibbon have put the matter in regard to pulp wood in such a way that we should have these large profits which Mr. McGibbon estimates as the difference between three dollars and a-half in the one case and forty dollars in the other, that were actually given away—that we should have this thirty-seven dollars which we could give our merchants, but which goes elsewhere, simply because we do not make an effort to manufacture the raw material into articles that would produce these profits. It applies not only to pulp wood, but to all the raw materials of Canada. I think it is time if the country is becoming richer, as our bank deposits in the last few years indicate, that we might put a little of our capital into these enterprises, and retain a little of the profit which we have been handing to the manufacturers on the other side. I speak with due regard to Dr. Fernow, and I think he will be glad to know that a principle which has been adopted so universally on the other side, will be adopted, to some extent, here.

Mr. Cary brings another matter to my mind, which I will refer to. He says he is a trained forester, employed by one of the pulp companies in Maine. That is one of the things we need in connection with forestry. In the past in this country we have been looking at the forestry question very much from a theoretical point of view, but it is time we should look at it from a practical point of view. How can we utilize our great resources here in such a way that they will be not merely a source of present revenue to the government and present profit to ourselves, but will be a source of profit for all time to come? It strikes me that that is one of the matters that we might take up in this country. The time is coming, and coming soon, when every large lumberman, every pulp manufacturer, every large company engaged in any enterprise connected with this lumbering or pulp manufacture, will require to have a trained forester as one of the employees of the company, who is considered a necessary part of the equipment of the company, one of those men who will look after all their forest preserves, to see that the lumber is cut in the proper method, that every saving that can be made shall be made, and that all the interests that we for years have been fighting for in the matter of forestry shall be looked after. It seems to me it is a question which every man in that line should find extremely profitable. I am not without hope that the matter may be taken up by at least one of our colleges. It has been discussed, and I hope our friend Dr. Fernow, who has been the pioneer in taking up the matter, will find in another year that we have been following in his footsteps, and at least trying to conduct the operations efficiently here.

There is one other suggestion I have to make, and it is in connection with the value of our goods. It is merely a suggestion, because I cannot say that I have gone into the question in such a way that it affords me any proof that it is so. The matter was first drawn to my attention by the fact that in one place, one of the woods, poplar, which has been regarded down here for all time past as a poor indifferent wood, excepting that it has been used for pulp wood, has been found up in the North-west—at least, so far as I have been able to make inquiries—to be of a better quality apparently arising from climatic conditions there. Then again, we know that the Manitoba wheat is of superior quality, owing to the climatic condition. I refer to our No. 1 hard. Then the melons produced here are highly esteemed, on account of the climatic conditions, and the hotel

keepers to the south get them and demand them in preference to their own, and in the case of fruits too, our own apples, on account of climatic conditions, are of a superior kind. So that it occurs to me that probably our lumbermen could, on investigation, find that in the actual use of our different kinds of woods, they are really of a better quality than those grown to the south of us, those conditions to which I have referred having the effect of producing a better quality of wood. This is merely a suggestion, but it seems to me it will be found to be true. Those who are actually in the business of making furniture, for instance, and all those other uses to which wood is put, will be much more able than I am to have opportunities of testing that. It is merely a sugges tion that I offer as worth investigation.

Mr. THOS. SOUTHWORTH—We should all like to hear Dr. Fernow.

Dr. FERNOW—I am grateful to the association for having such confidence in me—more confidence apparently than my people at home. I should like also to express my gratification at hearing so much good, practical common sense. I have been attending forestry meetings for twenty years; I have not had a year without one, and sometimes half a dozen, and I have not attended one at which I have heard so much good, common sense and practical issues, as it were, with none of that sentimentalism in the air, none without a definite point. That feature has struck me, both in the forenoon and afternoon sessions, and I hope that by saying so it will encourage gentlemen to stand by the practical questions that are involved, and let the sentimentalism be taken care of by the ladies.

United States forestry at the present time suffers from sentimentalism, especially in our little practical beginning in the Adirondacks. We find now that we are expected not only not to cut down to given distances, but not to cut trees at all. Why? If the foresters cut the trees down at all we will not have any trees!

As a good American citizen, I hope that Messrs. Joly and McGibbon will not press the matter which has been referred to, but as a cosmopolitan philosopher, and as a simple student of political economy, I think there can hardly be two sides to the question. It is one of those things which has always struck me as one of the most remarkable pieces of—

Professor MACOUN—Stupidity.

Dr. FERNOW—Is that the name for it? My command of the English language is not always ready. Of course, no country will be so foolish as to export the raw material with which to carry on its manufactures. Mr. Johnson showed me this morning that Germany is importing sixty million dollars of wood material over and above its exports, which proves, first of all, that they do not have forest land enough, in spite of all their conservative management. The population has been growing, and so have the imports been growing. We want, however, to look not only at the amounts imported and exported, but we must consider what they mean. Do not count the hogs and dogs alike, but find out what the value of each is. I have no memory for figures to state precise data, but if you examine the character and value of these exports and imports you will find that the wood that the Germans export and the wood materials manufactured, translated into cubic feet of wood—and their statistics show them in that way—is worth two or three times as much per cubic foot as what they import. In other words, they export the manufactured article to which they have applied their skill and

their capital in making it into useful articles, and they import the raw material, because the other nations are like the province of Quebec—

Mr. GEORGE JOHNSON—These sixty millions are an overplus, over and above the exports.

Dr. FERNOW—I understand.

Mr. GEORGE JOHNSON—The manufactured articles exported are included in the exports, and still there is an overplus of sixty millions.

Dr. FERNOW—But the point is that the exports are made up of things into which they have put value by skill and labour, and the imports raw material—the less valuable article.

I did not know that Mr. Joly would use my letter, and I evidently must be careful in future as to what I write, because I have been quoted twice from letters which I dictated off-hand to a stenographer, not thinking they would be used in that form. What I wanted to impress upon Mr. Joly is that a diameter limitation is merely a makeshift for something better, and I wanted to caution him against accepting any such limit as a real forestry measure; it cannot produce what you want to produce, namely, a new stock of timber—it is not silviculture. When a lumberman says that the reproduction is such that in twenty years he can go back, he means that in twenty years some of the trees which he did not cut have grown up, but the young crop that starts without a diameter may not be there; the diameter limit does not assure any reproduction of young seedlings.

It may interest you to know how we have gone to work on our college tract. We cut timber, because we are harvesters as well as planters. We reap as well as secure a new crop. We know the various methods that might be employed to secure this new crop, not the additional diameter growth of the trees we found already on the ground planted by nature, but a new crop which is to secure the succession. One method is to secure the young crop from seed fallen from the old crop. When you are operating in mixed woods you can see that in this method the new crop is beyond your control to a very large extent. You find that the very kind of trees which you do not want to reproduce are the ones that sow their seed. Nature seems to take a delight in reproducing weed trees rather than the good trees. This is especially so where the valuable species are in the minority. So that finally I have come to the conclusion that where we have culled woods—that is, the good species already taken out—we would prefer, if financially able, to cut away the entire old crop and replant; when we know exactly how many trees we set per acre, and we know what we reproduce. We do not yet practice this method, but we combine artificial planting with natural regeneration, leaving some of the natural growth to reproduce itself. When we give instructions to our man to mark out the trees to be cut, he has, to be sure, a diameter limit to guide him, from which, however, he is allowed to deviate above or below in any particular case that requires the deviation for the sake of the future crop. Such discretion, of course, cannot be given to a wood chopper, but only to a man who is instructed how to use that discretion; in other words, to a forester. And I think the proposition of Mr. Drummond is a proper one, namely, that it is useless to put a diameter limit on paper unless an inspector enforces it in the woods, or else there will not be any obedience to your rule, and there will be mischief otherwise.

As Mr. Cary has pointed out, there may be conditions in your spruce woods such that if you cut only to the twelve inch diameter you do more mischief than if you had cut down to a seven inch diameter. My very first experience on the college tract was in that direction. We too were struck by a gale, seemingly at the same time as Mr. Cary's woods, and the nice seed trees that we had allowed to stand for a future generation, and for reproducing themselves were blown down by the gale, all we had was the extra expense of going over the same ground again and removing this blown down material. So that we find it under certain conditions desirable to cut down to a much lower diameter than the one I had set as a rule, twelve inches, simply because it happened to be the favourite diameter; but we found out in this case that a twelve inch diameter was a failure, and we now cut down to what nature intended we should cut to. Wherever there is a dense spruce woods, and it is likely that the younger trees cannot stand up, if the culling removes the older, it may be preferable to remove to a lower diameter. Wherever there is hardwood, and you do not cut the hardwood, your diameter limit may work another mischief from the standpoint of securing a fair reproduction of the spruce. I throw out these suggestions, so that you may not run away with the idea that by having established the rate of growth of diameters you have come to a sylvicultural measure: that is, one that will by necessity secure a future crop. There are many cases in which there would not be any satisfactory result in this direction from the diameter limitation, which again points out the necessity of having educated foresters direct the work of marking and cutting the trees. Beside Mr. Austin Cary, who is employed by a company owning about 300,000 acres of spruce land, I know of only one other company employing a forester, a product of the Cornell College of Forestry, to direct their woods work. Otherwise lumbermen have not found out the desirability of utilizing these young men. Nor are these young men, just from college, lacking in judgment and experience, perhaps the best guides, without years of training and practice, hence if you intend to employ foresters, you will have to begin their education early enough; it will take at least ten years after you have started before you have men who are capable of directing such operations with sufficient judgment.

I do not know that I can add any further light on any point, excepting to once more point out the general aspect of matters, that there are many things which we know to be the right things to do, and yet we are unable to do them, because of financial limitations. I was put in charge of the college tract in the Adirondacks, and was enjoined by the law 'to cut timber and to sell it and reproduce it and sell it, and earn a revenue therefrom.' This was an experiment to see whether forestry could be conducted on business lines. There was no market where we were. We had to create the market; that is to say, we had to induce a manufacturer who would use our hardwoods to locate a mill which might cut up the logs, and use the cordwood. I found the main trouble—and that is so in Canada just as in the United States—was to utilize the cordwood, the debris, and the tops, which do not go into logs, and I found that in our hardwoods in the Adirondacks the cordwood part represents between two and three times the amount of material that you find in the logs. If you have a thousand cubic feet of logs you will have two to three thousand cubic feet of cordwood to handle, and that, therefore, is the more important question. If you leave it on the ground you invite, first of all, the danger from fire, and secondly, you prevent the reproduction of your crop.

Mr. E. STEWART—You are cutting clean in that case?

Dr. FERNOW—We are not yet cutting clean, but I come to the conclusion now that denudation is the much better and cheaper method, and then replanting; and we have nurseries producing two million seedlings a year, so that we can plant quite a large area, and probably if we are allowed to continue our work, that will, in many cases, be the best method, although not so everywhere. I can only encourage you in the direction that is indicated by the two papers which have been read on the pulp wood question, first to revise your tariff, and secondly, to revise your diameter limitations.

Mr. E. STEWART—I beg to suggest, as we have a good deal of business yet to transact, without pretending to interfere with any who wish to speak, that it will be necessary to curtail discussion, or we will require to hold another day's session.

The CHAIRMAN—It is very encouraging to think it is so.

Professor MACOUN—There was one matter that was brought up that was not emphasized enough, I think. Dr. Fernow just threw it out as a suggestion, and that is complete denudation. There is not the slightest doubt that in years we will come to it. When the pulp wood is taken out of a tract of land, picture to yourselves the appearance of the forest, and ask yourselves whether anything will grow there with these tops piled eight and ten and fifteen feet, and a fire coming six or seven years after, and sweeping the whole thing out. Why not cut it all down as he says, and clean off the ground with a fire or two fires, and then let it alone, and you will get a new forest and a valuable one. I am quite sure that we will come to it, and we will agree that complete denudation is the only hope.

Mr. THOMAS SOUTHWORTH—At the risk of wasting the time of the meeting to some extent, I would like to refer to one or two points raised by Dr. Fernow. One point is that he referred to the lack of sentimentality and the common sense nature of the papers delivered to-day, and I may say that I believe that a very great deal of the elimination of sentimentality on the forestry question in Canada is due to the writings of Dr. Fernow. He was one of the first men in the United States to convince business men, both here and there, that the advocates of forestry were not, as they are frequently called, fanatics, but were looking at forestry from a purely business standpoint. I know that was the case here at that time, that any man who advocated anything like a rational system of forestry, was a man who merely looked at the esthetic value of trees, and that aspect of it only. Dr. Fernow refers to denudation as the best method in the Adirondacks, and Professor Macoun is of the opinion that that will be eventually followed here, but they seem to differ in their methods of denudation. Dr. Fernow proposes to denude completely and replant, and Professor Macoun says to burn off the rubbish and let nature do the rest. Is Dr. Fernow not of the opinion that artificial planting would be impracticable from our point of view? He has established on the Adirondacks a local market to use up the débris, which we cannot do here, and I am of the opinion that it would be utterly impossible to plant, owing to the large expense. Conditions vary, of course, and I would like his opinion as to whether he thinks in the first place, it would be possible to destroy some of the débris left in ordinary lumbering operations where we cut only the pine timber without destroying the rest of the forest, and if he thinks it would be possible in areas even moderately near a market, to replant and have a result in crop of sufficient commercial value to pay the cost of planting and compound interest for the length of time necessary for the crop to mature.

Dr. FERNOW—If it is not possible to destroy the débris resulting from a logging operation—and sometimes it would probably be a dangerous use of fire—it is at least possible to lop the tops so that the brush falls to the ground, when it is less dangerous. We are burning brush in our operations in the Adirondacks, piling the brush; the only objection we find is the expense.

The question of profits is a difficult one to answer, but I am convinced that our planting of white pine in the Adirondacks—provided the fire is kept out—will pay a good interest. Let the cost of planting per acre be as much as $10—we plant at less. In sixty years this would be at 4 per cent—which is a high rate to compound with—$105. Even if the stumpage prices sixty years hence should not be more than $5, this would mean that 21,000 feet per acre must then be grown, while in German forests a yield of double the amount is not rare, and prices are sure to rise.

To be sure, this is a long time investment, which means present expenditure for the sake of a benefit in the distant future. Hence the state alone is able and competent to undertake such planting; or else a company of long life. For most private concerns it would hardly appear desirable to go into such planting, and it will be some time before governments in good earnest will undertake it. Yet finally it will have to be done.

I may recall in this connection what I wrote to the Rev. Mr. Burke: 'When you have a dilapidated house, you cannot use it, unless you spend the capital to rebuild it.' This is the condition in Canada and in the United States of large areas from which the valuable species have been culled, or extirpated, the weed trees being left. It is just so much waste land; the trees are only an encumbrance, preventing the regrowth of valuable species. They must be removed and the better kinds planted, as we do in the Adirondacks.

Mr. E. STEWART—I think that we might perhaps reverse the order of business and get through with what motions there may be, and then proceed with the election of officers.

Mr. THOMAS SOUTHWORTH—That would be best.

The CHAIRMAN—I think that is the practical thing to do, and if you have exhausted the subject that has been before us, we will now proceed to take any motions or resolutions that may be made.

Mr. E. STEWART—I beg to move, seconded by Dr. Fletcher—

'That this Association desires to place on record its appreciation of the great loss that it has sustained by the death of Hon. Senator Allan, one of its directors. Senator Allan took a most active interest in all matters pertaining to the welfare of our forests and woodlands, and this association takes this its first opportunity of conveying to his family its regret at the great loss which they have endured. That a copy of this resolution be forwarded to Mrs. Allan.'

I have only to say that the executive, at its first meeting after the death of Senator Allan, passed a similar resolution, but I think it is quite in accord with the feelings of the association to pass such a resolution, knowing the eminent services that Senator Allan has performed for the interests of forestry long before this association was in existence.

Dr. FLETCHER.—I will second the motion. Every one knows the great work Senator Allan did for a great many years in Canada.

The motion was adopted.

Mr. E. STEWART—There is a notice of a motion that the constitution be changed by adding a Patron to the list of officers and reducing the quorum of the Executive Committee. Clause 4 will read as follows:—'The officers shall include a Patron.' The word 'Patron' is inserted between the word 'include' and the word 'an' in the first line, and clause six will be amended by substituting 'three' for 'five' in the second line. I move that these changes be made.

Prof. MACOUN—I second the motion.

The motion was agreed to.

Mr. E. STEWART—I have much pleasure in introducing to the association a gentleman who has come all the way from the North-west to attend this meeting. He came in a little late yesterday and wished to say something on the paper I read this morning, but unfortunately happened to be out at the time. He informs me that he has a motion to make now, and I beg to introduce Mr. Thompson.

Mr. THOMPSON—The secretary has informed you that I have come a long distance to attend this meeting. I came from very nearly two hundred miles west of Winnipeg, but I do not regret it, I am delighted that I came. I had no idea I should have such an immense treat as I had last night in hearing the lecture and also hearing the papers read yesterday and to-day. They have been of a practical nature, and the motion that I am going to submit to the meeting is of a practical nature. More than a year ago Mr. Stewart came up to Manitoba, and we had a meeting in Winnipeg, and also meetings through the country districts on the forestry question. Before that time, some of the farmers had been trying to grow trees, but without a proper knowledge of how to do it, and a great many of the trees died. But the impetus Mr. Stewart and the gentleman that went around with him gave to those meetings was very great, and interested the farmers at that time, so that a great many are preparing ground to have trees planted, and I understand quite a number of them have already planted trees. The proposition was that the farmers should get the ground ready and the government should furnish about five hundred trees to each man. This is going to be a great work and it is going to take a great many trees, because the interest is growing now, and as so many farmers will get ground ready and the trees planted, and they begin to grow up, other farmers will see them and observe the improvement in the appearance of the farm and will also want trees. We have about fifty thousand farmers in the North-west, and we expect that next year there will be two thousand or perhaps more, applying for trees, and that means about three million small trees. If there were three or four thousand farmers it would be so much more. The idea that some of us have up there is that there should be small tracts of land, say perhaps, twenty or twenty-five acres taken at different places, good for growing trees, arranged for by the government and a stock made in this way so as to get a supply of trees for the farmers. I will not take up very much time of the meeting. I am not one of those accustomed to speaking, but when I go back I will make some of them regret that they did not come down, and I hope if we are here another year that some other gentlemen will come down. There is one thing I would like to say. I do not know whether it is the practice of this association to print the papers that are read at the meeting, but I think it would be a great advantage if that were done. The motion that I make is as follows:—

Whereas the Canadian Forestry Association was organized with the view of furthering certain primary objects as set forth in its constitution, prominent among

which were, first, the proper management of the Crown forests and, second, the encouragement of forest tree planting in the prairie regions of the North-west, the said association at this its third annual meeting desires to express its gratification that the government of the Dominion is moving in the direction indicated, but considering the extent of the work devolving on the forestry branch it would respectfully call the attention of the government and parliament to the obvious fact that the appropriations hitherto voted for the purpose are inadequate to carry out properly a work of such extent.

The association begs to point out that while the forests under the federal government of the United States are of much less extent and value than those under the control of this Dominion, the appropriation made by congress last year for forestry purposes was increased from $88,520 to $187,240, while the amount voted by the Dominion for the same purpose was only $15,000.

The great extent of forest under the Dominion demands careful attention not only for the value of the timber, which will undoubtedly prove in the future one of its greatest assets, but in order that a sufficient area be perpetually maintained in timber for climatic reasons, and to regulate the water supply of the country, and the association urges the necessity of dealing with this phase of the subject both promptly and energetically.

Resolved, that a copy of the above resolution be presented to the Dominion government.

The resolution was adopted.

Mr. McWILLIAMS—Referring to the matter which we were considering yesterday afternoon with regard to exploring lands before sending in settlers, I beg to submit the following resolution :—

In view of the enormous loss of timber by fire, this association, embracing a membership from all parts of the Dominion, having at this its annual meeting had under consideration the great mistake that has been made in the past by opening up for settlement land unsuitable for agricultural purposes but adapted for the growth and production of timber, would respectfully urge on the governments of the country, both federal and provincial, the necessity of greater attention in the future to this important subject.

The association would further urge in order that this may be intelligently done that the newer and unsettled portions of the country should be explored in advance of settlement.

That the executive committee of the association be instructed to bring this important matter to the notice of the different governments, and that the lumbermen's associations be requested to appoint a strong committee to act with our executive committee in asking that settlement be prohibited on ungranted land unfit for agricultural purposes.

Professor MACOUN—I second the motion.

The CHAIRMAN—Perhaps the matter could be discussed. It was suggested that a committee should be appointed.

Mr. McWILLIAMS—The executive committee of this association would confer with a committee of the Lumbermen's Association. After your officers are elected you have your committee.

Mr. STEWART—You do not state the number of lumbermen who would be asked to assist.

Mr. MCWILLIAMS—The more the better.

Mr. GEO. JOHNSON—I understand Mr. McWilliams proposes that when the new committee comes into office, this shall be an instruction to them to appoint a committee of certain of their number to meet a committee of the lumbermen's associations to discuss this question with the practical purpose of presenting to the governments of the different provinces a conclusion as to whether it is desirable to work in those lines or leave things as they stand.

Professor MACOUN—And an equal number of each association should be on the committee for this reason; a lumberman's committee might consist of ten, and the executive committee of our association might consist of three, and it would not give our society a fair show. I think we should have the same number in each case.

Mr. J. R. BOOTH—I think the motion is in the right direction, and I should like to know from this meeting if that is endorsed by this whole meeting. If it is we could send a copy of that to the several governments of the provinces and ask them to appoint a committee to carry out such ideas as are suggested in that motion.

The CHAIRMAN—That is covered by the motion.

Mr. GEO. JOHNSON—Mr. Booth proposes that the government shall appoint a committee, that the lumbermen shall appoint a committee and that the foresters should appoint a committee, and that the three committees shall discuss the question.

Mr. MCWILLIAMS—I suppose they would refer it to the Commissioners of Crown Lands in the local governments, and the Minister of the Interior in the Dominion government.

Professor MACOUN—I think that could be arranged by the committees themselves. By doing it now we might do it imperfectly, but if the two committees are appointed they can act.

Mr. THOS. SOUTHWORTH—I think that resolution restricts the scope of the work to be done by the committee merely to the separating of agricultural from non-agricultural land, and the exploration of territory previous to that being done. There are several questions concerning the tenure of lumbermen, in the province of Ontario particularly, (I am not so thoroughly conversant with the conditions in the province of Quebec,) that are equally pertinent. There is the question of squatters, and when lands should be cancelled and withdrawn from timber licenses, to be opened for settlement. Those are cognate subjects and just as important as this. I do not think the work of the committee should be restricted, but that the whole question of colonization and timber exploitation should be taken up, and I think if the request came from this association, asking the government to appoint a commission to meet with them, that it possibly might be done. I do not know that they would do that. That is Mr. Booth's suggestion.

Mr. STEWART—Which government?

Mr. THOMAS SOUTHWORTH—Each government. This is really one of the most difficult problems, as far as Ontario is concerned, and one of the most difficult problems to handle with reference to the exploitation of land, and the government appreciates the difficulty quite as fully as the lumbermen. I happen to have to do with the colonization of new lands as well as being connected with forestry matters, and I know just how difficult the matter is, and there are really two sides to the question, and I think the motions should be expanded so that it will allow a little more latitude and I agree with Mr. Booth that it might be arranged in that way.

Dr. FLETCHER—Is it not better to take one thing at a time, to attend to this part of the business first and then take the other afterwards?

Mr. THOS. SOUTHWORTH—It is the same thing.

Mr. MCWILLIAMS—This question came up with respect to preventing forest fires. It was admitted that the settlers going into lands unfit for settlement, was the cause of a good many fires, and the thing was to have something done to stop the settlement, and if we did that we would do away with the forest fires to a great extent. That was the object of the resolution, and I think in a general way it covers what Mr. Southworth refers to, because if the land is unfit for settlement, they would not permit them to settle. With reference to the land under license not fit for settlement, it will be closed.

Mr. THOS. SOUTHWORTH—But if it is fit for settlement?

Mr. MCWILLIAMS—I would not agree for a township to be opened for settlement, unless you could get sufficient land for a good large settlement, because a great injury is done by crowding in settlers even if you have four or five hundred acres of land fit for settlement.

Mr. THOS. SOUTHWORTH—Your resolution simply implies a recommendation to the government that lands that are not fit for settlement should not be allowed to be settled. I think that should also include the question of lands under license that are fit for settlement. You exclude that from the resolution entirely, and it seems to me to be just as important as the other.

Mr. STEWART—I do not think it limits it at all. They are instructed to bring this matter to the notice of the government. The resolution seems to include licensed lands as well as other land.

Mr. THOS. SOUTHWORTH—That does not affect Ontario, because it is the policy of the government of Ontario, at present, and it has been for the last two years. Lands that are to be surveyed are being explored now before being surveyed into townships, and land that is found not to be suited for settlement not being surveyed. But if we are going to ask the government to meet with us, I think we should go further.

Mr. E. STEWART—Would you go further and ask that it be set apart for forest reserves?

Mr. THOS. SOUTHWORTH—No, not so far as Ontario is concerned, because that is settled.

Mr. STEWART—The resolution says :

'That the executive committee of the association be instructed to bring this important matter to the notice of the different governments, and that the Lumbermen's Association be requested to appoint a strong committee to act with our executive committee in asking that settlement be prohibited on lands unfit for agricultural purposes.

Mr. GEO. JOHNSON—Mr. Booth's suggestion—I do not know that he has pushed it to the point of an amendment—is that this association take such measures as will bring into active co-operation the lumbermen's association and the several governments of the country with a view to settling this question.

The CHAIRMAN—Would it not be well to preface this resolution by a short preamble to say 'owing to the great destruction of timber by forest fires, that this association'—a sort of preamble to show what we are aiming at—fire protection. There is nothing said about fire protection. This would give us a reason, and that is the real reason—to protect our forest from fires.

Mr. MCWILLIAMS.—I have no objection.

Mr. SOUTHWORTH.—I have no objection to the resolution carrying as it stands. But if Mr. Booth's suggestion is adopted, I think it should be embodied in the motion.

Dr. FLETCHER—They are to meet the government and it is no use our dictating to the government how they shall meet us. It may be a committee, and it may be their Commissioner of Crown Lands.

Mr. MCWILLIAMS—I will put it in this way : 'In view of the enormous losses by fire.'

The motion was carried.

Mr. MCWILLIAMS—I ask that our Secretary be instructed to send our reports to Mr. Fitzpatrick. Some years ago Mr. Fitzpatrick who was a student at Queen's College, started reading camps among the lumbermen in the northern territory, and I visited two at Victoria Harbour and another place, and I was so pleased that I asked for an appropriation to assist him in his work. Since that time he has succeeded in opening quite a number of reading camps, and it is quite a help to the lumbermen. They have camps built separate, where they meet in the evenings. They have small organs, and the men spend a few hours in the evenings. I think these reports will be interesting to these men, and it would be well to have our secretary send a number of the reports to Mr. Fitzpatrick to be distributed in the lumber camps.

The CHAIRMAN—It does not require a resolution for that.

Mr. E. STEWART—The number generally printed would hardly admit of that.

Mr. MCWILLIAMS—Twenty-five might do.

It was moved by Mr. E. Stewart, seconded by Dr. Jas. Fletcher and resolved that the association desires to express their thanks to the Railway Companies for their kindness in furnishing free return passage to those attending this meeting of the association, and that a copy of this resolution be forwarded to the manager of each company.

It was moved by Mr. Geo. Johnson, seconded by Mr. R. H. Campbell and resolved that the thanks of the association be extended to the press for the interest taken by them in the meeting and the reports of its proceedings which they have so kindly published.

A resolution was also passed thanking the Minister of the Interior for the assistance to the association rendered by the Superintendent of Forestry.

The election of officers resulted as follows :—

Patron, His Excellency the Governor General ; Honorary President, His Honour Sir Henri Joly de Lotbinière, Lieutenant-Governor of British Columbia ; President, William Little ; Vice-President, Hiram Robinson ; Secretary, E. Stewart ; Assistant Secretary and Treasurer, R. H. Campbell ; Board of Directors, Professor John Macoun, C. Jackson Booth, W. C. Edwards, M.P., C. E. E. Usher, E. G. Joly de Lotbinière, Thos. Southworth, Dr. Wm. Saunders.

An evening session was held on Thursday evening at eight o'clock, in the lecture hall of the Ottawa Normal School, at which a lecture entitled 'Evolution of a Forest Growth' was given by Dr. B. E. Fernow, Dean and Director of the New York State College of Forestry, Cornell University. The lecture, which was illustrated by over one hundred magnificent views, was greatly enjoyed by the large audience present, and at the conclusion a very hearty vote of thanks was passed to Dr. Fernow.

THE PRESERVATION OF OUR FORESTS.

J. R. ANDERSON, *Deputy Minister of Agriculture, Victoria, B.C.*

At the suggestion of His Honour, Sir Henri Joly de Lotbiniere, I have undertaken with much trepidation, and many misgivings of my ability, to treat the subject in the manner which I feel is due to one of the magnitude and importance of forest preservation. I can but hope in the short paper I now present to direct attention to what is unquestionably a subject of the greatest commercial importance to Canada, to say nothing of its sentimental aspect; and so perchance to elicit ideas how the object of this paper can be best attained. It is only by united effort that we can hope to attain what I am sure is the heart's desire of all of us, viz.: to conserve the forest wealth of the country for the general good, not only of the present generation but those to follow, and to preserve for posterity if even a vestige of the glories of the primeval forests.

Let me first try and picture to you a forest in whose bounds are included, towering snow-capped mountains, pellucid lakes, streams fed by the glaciers above, thundering down the dizzy precipices of the mountain sides, and anon finding resting places in the still, forest-protected pools, then rushing on to their destination, through pebbly reaches between moss and fern-covered banks, and above all the grand giants of the forest, standing like the sentinels that nature has created them ; guarding the stores of precious life-giving water. This is a true picture, one of many to be witnessed, and one in which my good friend Dr. Fletcher shared with me during a trip up Mount Arrowsmith last year. But what of this picture which I have so feebly attempted to describe? How long will it last? Any time we may see the ruthless hand of man despoiling it of its sylvan beauty, or the devasting forest fire consuming alike its beauty and its value. Then consider the picture of ground denuded of vegetation, the vegetable mould burned away leaving the blackened roots and bare rock or gravel subsoil exposed, trees, veritable monarchs of the forest, lying in blackened ruins forming an impenetrable embarras,

the watercourses exposed to the summer sun, reduced to but a shadow of their former selves, like the sixth age of man, adapted, 'its bed a world too wide for its shrunk stream.'

I dare say you have all seen such sights, they are but too common, especially so in our western province, where the forest wealth has been lavished by nature with such a prodigal hand, there the forest has been looked upon, except by those whose avocations teach them that it is a source of wealth, but as a barrier to settlement and a hindrance to the prospector seeking for mineral wealth, to be destroyed and got rid of at any cost. It is well indeed that this association should now sound the note of alarm ; it is none too soon, for we all, in our day, have seen the effects of procrastination. Whole districts have been deforested by wasteful methods and culpable carelessness. Failing to take warning from the older settled portions of the continent, the dried-up water courses, lands washed bare of soil, floods, and all the consequent evils bear silent but indubitable witness to the effects of deforestation. Failing to take a lesson from the provident methods of our own mother country and other lands, we have allowed, and are allowing, the land to be denuded of its forests and have not made provision for its reforestation. In British Columbia we have vast forests of valuable timber, but even in my time, whole districts have been rendered treeless, and were it not for the provident hand of nature which itself reafforests in its own way, there would not now be a vestige of timber growth, where the destroyed forests existed ; and even in many tracts which have been thus reafforested, fire has often, again and again, been allowed full sway. Under these conditions it is not difficult to foresee that, if a halt is not called, we will live to regret that action was not taken to preserve the bountiful gifts of nature. Let it not be understood that I mean hampering the lawful business of the lumberman, or placing vexatious restrictions to his detriment and loss ; on the contrary, I quite acknowledge the value of his calling, and the immense importance of the industry to our country. But I do maintain, that the methods pursued should be put under strict supervision, and under equitable safeguards, not only in the interest of the country generally, but in those of the lumbermen themselves.

Now as to the safeguards whereof I speak, I feel that I am helpless in offering adequate suggestions and whilst it is possible to enact laws and to carry out their provisions regulating the timber industry, I feel that the further, and far more difficult question of preservation from the other causes of destruction, still remain to be solved, questions which we know will tax the ingenuity of the cleverest to suggest practicable remedies for ; and at the best, it is apparent in a country like British Columbia, that even with the most practicable suggestions, and with the utmost efforts which can be put forth, we can only hope for a mitigation of the losses which are now occurring. Nevertheless if even a modicum of good is effected it will be work well done and I feel that it is the duty of every member of this Association to express his views, and to make suggestions, and for the Association to take up, the broad question of the preservation of our native forests from the inevitable destruction which now threatens them. The question being really one of a national character, perhaps it might be suggested that the whole management of the forests be placed in the hands of qualified commissioners appointed jointly by the Dominion and the several provincial governments interested. These commissioners after fully satisfying themselves regarding the existing conditions, would be in a position to make suggestions for the guidance of the various legislatures in framing laws and for the assimilation as far as circumstances will admit, of existing regulations. It is true the expense of such a commission would no doubt be great, but we cannot hope to attain much without a liberal expenditure, and surely the interests involved warrant any reasonable outlay. These ideas of mine may be considered Utopian and unworthy of consideration, and if so, I only trust some member may suggest a scheme more worthy of consideration.

In British Columbia timber limits have been let without restriction as to size, shape, or whether conterminous to other locations ; as examples, see map sent herewith (those parts marked T L). It will be observed that large continuous tracts, the line zig-zagging about so as to only take in the very best of the timber, have been alienated. This naturally leads to the suggestion that further timber limits should be granted only under the strictest conditions, as regards the conservation of the public interests in the

forests. It appears reasonable that timber lands should be laid out in regular blocks, that the government should reserve sections, perhaps alternately, that certain restrictions should be placed on the business of lumbermen, having in view the preservation of those parts of the forests that are not considered merchantable at the present time; such as a proper disposition of the brush and waste material so as to avoid as much as possible the danger of the spread of fire from this cause, devoting the revenue derived from the forests to their preservation by a system of wardens, or such other means as may be considered effective. In presenting these views for the opinion of the Provincial Timber Inspector, Mr. R. J. Skinner, the following reply was elicited, viz. :—

'Your plan would work out all right in some cases, but generally speaking the conformation of the country would not lend itself to any such system.

'The square mile system is pursued now with licenses which are really yearly leases, people holding leases or licenses will take all the timber there is any profit in taking, how to get them to do more than that is a question I am unable to answer. As for the supervision and the devoting of some of the revenue to that supervision, all I can say is that it appears to me that every dollar that can be raised either from timber, or any other source, has four or five purposes ready and anxiously waiting for it now. *Fire* is the *great enemy* and can no more be *prevented* in a forest than in a town, which in spite of fire brigades and insurance companies it burns up not infrequently.'

As far as British Columbia is concerned we need not fear that the proportion of forest, will, for many years to come, fall below that which Mr. Thos. Southworth, Director of Forestry of Ontario, says every country should have, viz.: at least twenty-five per cent of its area continually covered by forest, nevertheless it is the duty of the present generation to take up this question, and for the Canadian Forestry Association to direct its efforts towards inaugurating a national policy of forest conservation, so that those parts of Canada which have been denuded of their forests, may be reafforested; the portions naturally without wood, afforested; and those parts which now have an abundance, preserved from the fate of the thirty counties in Ontario which Mr. Southworth says have less than the percentage named.

In conclusion the thought has often occurred to me that one of the grandest monuments that can possibly be erected to commemorate some of the notable events which have of late transpired in the Empire of which we form an integral part would be the setting aside as a National Reservation, a tract of country such as I have tried (and I fear most lamentably failed) to describe. Or will some wealthy philanthropist perpetuate his name by devoting some of the world's goods wherewith he is blessed, to so good an object and preserve to future generations, 'a thing of beauty and a joy for ever.'

(NOTE—Mr. Anderson's paper unfortunately did not arrive in time to be read at the annual meeting of the association for which it was prepared and is therefore published as an appendix to the report of proceedings.)

R. H. CAMPBELL, Treasurer.

In account with The Canadian Forestry Association.

DR.			CR.	
To Balance from 1900		$175 15	By subscriptions to 'Rod and Gun' for 1900	$28 50
" Membership Fees		273 25	Travelling Expenses	13 50
" Interest		5 95	By Expenses of Annual Meeting	34 49
			" Vote to Assistant Secretary	50 00
			" Engrossing Address to His Majesty	10 00
			" Refunds	1 75
			" Printing	2 50
			" Balance	313 61
		454 35		454 35

Examined and found correct.

GEORGE JOHNSON,
J. M. MACOUN, } Auditors.

May 30, 1902.

MEMBERS OF THE CANADIAN FORESTRY ASSOCIATION

Ami, H. M., M.A., D.Sc., F.G.S., F.G.S.A.	Ottawa, Ont.
Anderson, J. R.	Victoria, B.C.
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Alexander, P.	Regina, Assa.
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Boyd, M. M.	Bobcaygeon, Ont.
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Batho, Geo.	Winnipeg, Man.
Baird, Thos.	Crystal City, Man.
Brown, Alex.	Glenora, Man.
Barclay, Robt.	Winnipeg, Man.
Beavis, H. J.	Crystal City, Man.
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Cochrane, Mrs. W. F.	Macleod, Alta.
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de Rosenroll, Anthony S., M.L.A	Wetaskiwin, Alta.
Rathbun, E. W	Deseronto, Ont.
Ricardo, W. Granby	Vernon, B.C.
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Roche, John D	Montreal, P.Q.
Ross, Norman M	Ottawa, Ont.
Rutherford, Wm	Montreal, P.Q.
Robertson, Jas	Glencoe, Ont.
Ross, John	Cardston, Alta.
Rielly, R. T	Winnipeg, Man.
Ring, John J	Crystal City, Man.
Ring, Robert	Crystal City, Man.
Rothnie, Jas	Virden, Man.
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Reid, J. Lestock, D.L.S	Prince Albert, Sask.
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Riddell, Geo., M.D	Crystal City, Man.
Saunders, Wm., LL.D., F.L.S., F.C.S., F.R.S.C	Ottawa, Ont.
Stewart, E	Ottawa, Ont.
Southworth, Thos	Toronto, Ont.
Spring-Rice, Gerald	Pense, Assa.
Spring-Rice, B	Pense, Assa.
Stupart, R. F	Toronto, Ont.
Scott, Miss Mary McKay	Ottawa, Ont.
Schenck, C. A., Ph. D	Biltmore, N.C., U.S.A.
Stewart, S	Ottawa, Ont.
Sifton, Hon. C., K.C., M.P	Ottawa, Ont.
Selby, Henry W	Dinorwic, Ont.
Stewart, Geo. A., D.L.S	Calgary, Alta.
Speight, T. B	Toronto, Ont.
Scott, James	Toronto, Ont.
Spencer, Mark	Cardston, Alta.
Stoddard, Marion	Cardston, Alta.
Spicer, H. H	Vancouver, B.C.
Snowball, Hon. J. B	Chatham, N.B.
Stead, Wm	Cardston, Alta.
Shaw, Geo. H	Winnipeg, Man.
Schultz, Frank	Baldur, Man.
Stevenson, A. P	Nelson, Man.
Stephenson, E. F	Winnipeg, Man.
Saunders, B. J., D.L.S	Regina, Assa.
Stewart, Jas	Crystal City, Man.
Simpson, H. C	Virden, Man.

MEMBERS OF THE CANADIAN FORESTRY ASSOCIATION—*Concluded.*

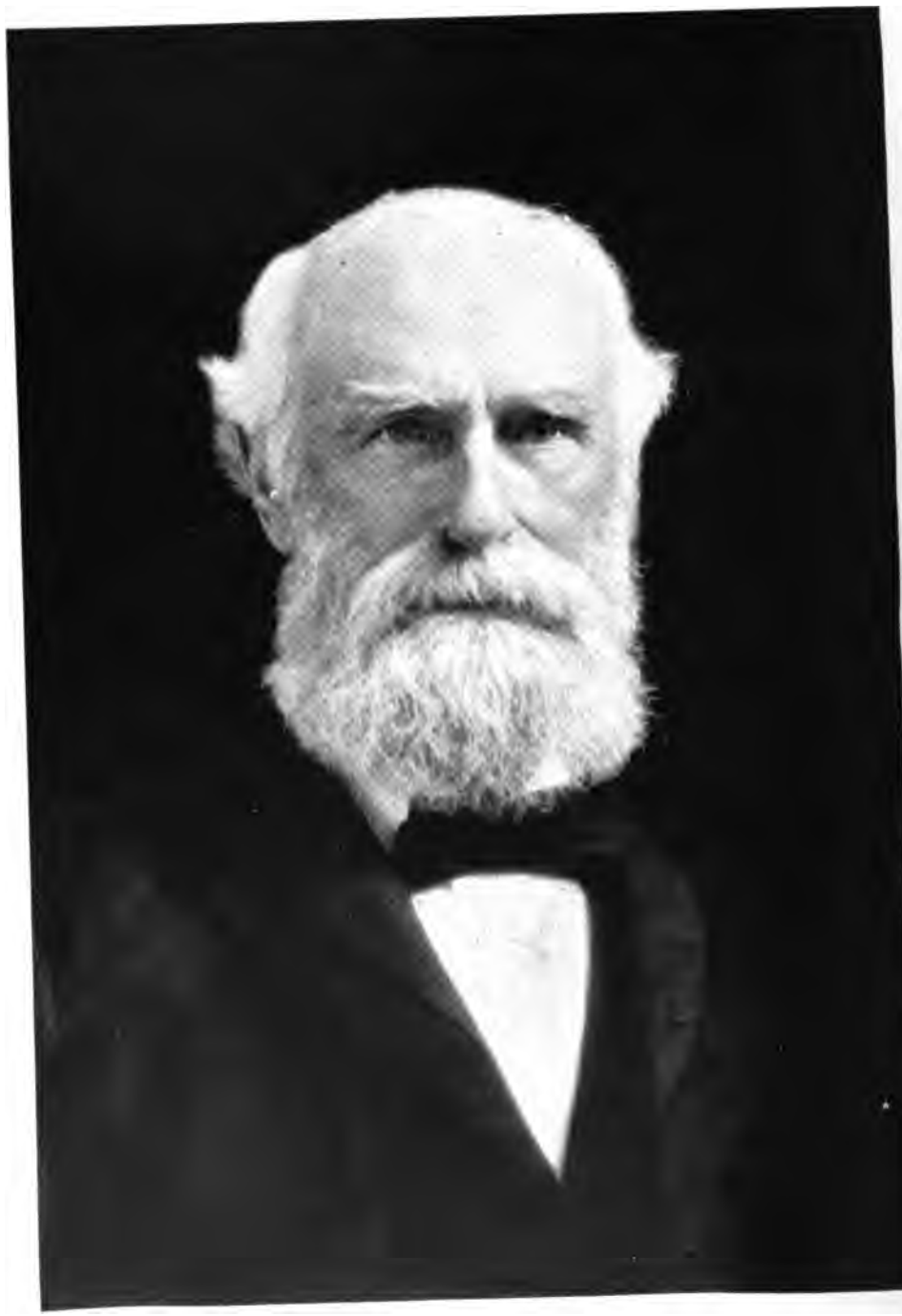
Stevenson, Dr.	Virden, Man.
Stephen, Wm.	Virden, Man.
Smith, J. P.	Crystal City, Man.
Sharp, R.	Crystal City, Man.
Sydere, Arthur H.	Toronto, Ont.
Smiley, Daniel	Mohonk Lake, N.Y., U.S.A.
Stafford, B. V.	Arnprior, Ont.
Stocking, Chas. P.	Waubaushene, Ont.
Ussher, C. E. E.	Montreal, P.Q.
Todd, F. G.	Montreal, P.Q.
Turner, Richard	Quebec, P.Q.
Thomson, Geo.	Orillia, Ont.
Toner, W. T.	Collingwood, Ont.
Todd, Guy M.	Montreal, P.Q.
Taylor, Hyrum	Magrath, Alta.
Taylor, Clement.	Winnipeg, Man.
Thomson, C. J.	Virden, Man.
Tweed, Geo.	Crystal City, Man.
Unwin, A. Harold.	Munich, Bavaria.
Taylor, J. W.	Stirling, Alta.
Toumey, Prof. J. W.	New Haven, Conn., U.S.A.
Vigar, Richard	Port Arthur, Ont.
Van Nostrand, A. J.	Toronto, Ont.
Vroom, J.	St. Stephen, N.B.
Vallillee, J. E.	Buckingham, P.Q.
White, Aubrey.	Toronto, Ont.
Westhead, Mrs. A. C.	Lacombe, Alta.
Wilson, F. D.	Ft. Vermilion, Atha.
Wallace, Wm. S.	Shellmouth, Man.
Warren, Col. F. W.	Vancouver, B.C.
Wadsworth, V. B.	Toronto, Ont.
Wallace, Jas. N.	Hamilton, Ont.
Ward, Hon. J. K.	Westmount, P.Q.
Wheelock, C. R.	Orangeville, Ont.
Williamson & Crombie.	Kingsbury, P.Q.
Waldie, John.	Toronto, Ont.
Williams, Sterling.	Cardston, Alta.
Woolford, Thomas.	Cardston, Alta.
Woolf, John.	Cardston, Alta.
Wright, John.	Cardston, Alta.
Watts, Miss.	Cardston, Alta.
Wheeler, Hector.	Regina, Assa.
Wilcox, David.	Cardston, Alta.
Wooley, O. A.	Magrath, Alta.
Woodrow, W. H.	Boissevain, Man.
Westhead, C. G.	Plymouth, England.
Wilson, Alvin.	Melita, Man.
Warren, T. B.	Melita, Man.
Wilson, S. Chivers.	Regina, Assa.
Wheeler, A. O., D.L.S.	Calgary, Alta.
Wood, A. W.	Plevna, Ont.
Wilgress, G. S.	Huntsville, Ont.
Wilson, J. F.	Hawkesbury, Ont.
Whyte, R. B.	Ottawa, Ont.
Wilson, Wm.	Whitemouth, Man.
Young, Hon. Finlay M.	Killarney, Man.
Young, T. S.	Toronto, Ont.
Young, Lee.	Cardston, Alta.

LIFE MEMBERS.

Sir Henri Joly de Lotbinière, K.C.M.G.
A. H. MacKay, LL.D., F.R.S.C.
Hiram Robinson.
W. F. Cochrane.
F. G. Todd.
F. D. Wilson.
Professor J. W. Toumey.
Frederick Law Olmstead, jr.
D. James.

FOURTH ANNUAL REPORT 1903

ARNOLD ARBORETUM
JAMAICA PLAIN,



MR. WILLIAM LITTLE, WESTMOUNT HEIGHTS, MONTREAL,
HONORARY PRESIDENT OF THE CANADIAN FORESTRY ASSOCIATION.

REPORT

OF THE

FOURTH ANNUAL MEETING

OF THE

CANADIAN FORESTRY ASSOCIATION

HELD AT

OTTAWA, MARCH 5 and 6, 1903

OTTAWA
GOVERNMENT PRINTING BUREAU
1903

CANADIAN FORESTRY ASSOCIATION.

OFFICERS.

PATRON:

HIS EXCELLENCY THE GOVERNOR GENERAL.

HONORARY PRESIDENT:

William Little, Westmount, Montreal.

PRESIDENT:

Hiram Robinson, Ottawa, Ont.

VICE-PRESIDENT:

Aubrey White, Assistant Commissioner of Crown Lands, Toronto, Ont.

PROVINCIAL VICE-PRESIDENTS:

Ontario.—J. B. McWilliams, Peterborough.
Quebec.—Hon. S. N. Parent, Quebec.
New Brunswick.—His Honour J. B. Snowball, Lieutenant-Governor, Chatham.
Nova Scotia.—A. H. MacKay, LL.D., Supt. of Education, Halifax.
Prince Edward Island.—Rev. A. E. Burke, Alberton.
Manitoba.—Major Stewart Mulvey, Winnipeg.
Assiniboia.—J. S. Dennis, Calgary.
Saskatchewan.—P. G. Laurie, Battleford.
Alberta.—William Pearce, Calgary.
Athabaska.—F. D. Wilson, Fort Vermilion.
British Columbia.—H. Bostock, Monte Creek.
Yukon.—The Commissioner, Dawson.
Keewatin.—The Lieut.-Governor of Manitoba.

BOARD OF DIRECTORS:

Wm. Saunders, LL.D., Ottawa, Ont.
Prof. John Macoun, Ottawa, Ont.
Thos. Southworth, Toronto, Ont.
J. R. Booth, Ottawa, Ont.
C. Jackson Booth, Ottawa, Ont
John Bertram, Toronto, Ont.
E. G. Joly de Lotbinière, Quebec, P.Q.

SECRETARY:

E. Stewart, Ottawa, Ont.

ASSISTANT SECRETARY AND TREASURER.

R. H. Campbell, Ottawa, Ont.

NOTICES.

The objects of the Canadian Forestry Association are :—

The preservation of the forests for their influence on climate, fertility and water supply; the exploration of the public domain and the reservation for timber production of lands unsuited for agriculture; the promotion of judicious methods in dealing with forests and woodlands; re-afforestation where advisable; tree planting on the plains and on streets and highways; the collection and dissemination of information bearing on the forestry problem in general.

The fifth annual meeting will be held in Toronto, on Thursday and Friday, March 10 and 11, 1904.

This association is engaged in a work of national importance in which every citizen of the Dominion has a direct interest. If you are not a member of the association your membership is earnestly solicited.

The annual dues are $1. The life membership fee is $10.

Applications for membership should be addressed to the treasurer,

R. H. CAMPBELL,
Department of Interior, Ottawa, Ont.

FOURTH ANNUAL MEETING

OF THE

CANADIAN FORESTRY ASSOCIATION.

The Fourth Annual Meeting of the Canadian Forestry Association was held at Ottawa, in the City Council Chamber, on Thursday and Friday, the 5th and 6th of March, 1903. The meeting was called to order at 10.30 a.m., Thursday, by the President, Mr. William Little, Westmount Heights, Montreal.

Those present were: W. C. Caldwell, M.P.P., Lanark, Ont.; Colin Rankin, Mattawa; J. R. Booth, Ottawa; Professor E. C. Jeffrey, Harvard, Mass.; Wm. Little, Westmount; Thos. Southworth, Director of Forestry, Toronto; Aubrey White, Deputy Commissioner of Crown Lands, Toronto; J. H. Faull, Toronto; Geo. Johnson, Dominion Statistician, Ottawa; A. F. McIntyre, Ottawa; T. S. Young, 'Canada Lumberman,' Toronto; C. Jackson Booth, Ottawa; E. J. Darby, Crown Timber Agent, Ottawa; Hiram Robinson, Ottawa; Dr. A. Harold Unwin, Ottawa; R. T. Pinkerton, Westmount, Que.; F. W. Cowie, Ottawa; N. E. Cormier, Aylmer, Que.; N. McCuaig, Bryson, Que.; Arch. Blue, Ottawa; Arch. M. Campbell, Ottawa; Henry Robertson, Collingwood; D. B. Dowling, Ottawa; F. King, Ottawa; A. Knechtel, Albany, N.Y.; Professor John Macoun, Ottawa; Dr. Wm. Saunders, Ottawa; Norman M. Ross, Ottawa; E. G. Joly de Lotbinière, Que.; F. C. Gendron, Mayor of Hull; J. R. Reid, President of the Ottawa Board of Trade; J. C. Browne; E. Stewart, Superintendent of Forestry, Ottawa; Geo. Simpson, Ottawa; Hon. J. K. Ward, Westmount; Robert Gorman, Ottawa; Sir Sandford Fleming, Ottawa; R. H. Campbell, Ottawa; D. A. Campbell, Ottawa; Sir James Grant, K.C.M.G., Ottawa; R. C. Clute, K.C.; J. B. Fraser, Ottawa; Col. D. Macrae, Guelph, Ont.; A. P. Knight, Kingston, Ont.; J. B. McWilliams, Peterborough, Ont.; Professor W. L. Goodwin, Kingston, Ont.; F. T. Shutt, Ottawa; Otto J. Klotz, Ottawa; Fred'k. Booth, Ottawa; Mr. Halkett, Ottawa; Lieut.-Col. White, Ottawa; Wm. Ide, Ottawa; R. H. Cowley, Ottawa; Mr. Gillies; J. Keele, Ottawa; Dr. J. T. Finnie, Montreal; Geo. Y. Chown, Kingston.

The president, Mr. William Little, of Westmount Heights, Montreal, upon taking the chair, said: Before proceeding with the regular order of business I have to ask the indulgence of the meeting to be allowed to correct an error near the top of page 32 of the published report of our third annual meeting, where it appears that I unconsciously used the word 'dues' instead of 'ground rents' when reverting to the annual area charge imposed on licenses issued to cut timber from Crown lands some fifty years ago. The government then exacted a rental of fifty cents per square mile as ground

rent for the first and subsequent year, at which rate it remained so long as the limit was worked on, but doubled this ground rent annually thereafter provided no timber was cut upon the limit, until it reached eight dollars per square mile within five years. This excessive rate, forcing the limit holder either to cut timber on all his limits, whether advantageous to do so or not, or suffer this heavy penalty, often proved a hardship to the lumberman in compelling him to carry on operations in a number of places, and also a loss to both him and the government from greatly increasing the risk of fire.

The president then delivered his address, which was slightly altered on revision: It is my pleasant duty to heartily thank the members of the Canadian Forestry Association for the great honour conferred upon me, by electing me during my absence to the high office of president of this association, in succession to His Honour, Sir Henri Joly de Lotbinière, now honorary president. I need hardly assure you that I appreciate this mark of your confidence most highly, and I much regret that circumstances have prevented me from rendering greater service to the cause we all have so much at heart. It must now be gratifying for you to know that forestry and the timber question are beginning to receive from the public some slight recognition of their importance, and let us trust that past indifference may be succeeded by immediate and serious concern.

It may look like presumption in me to say so, for possibly I might not be asked to again accept the high office of president of the Canadian Forestry Association, but since a single term should be sufficient honour for any one, and I am pleased to know that there are many here who could fill the place with credit, I must ask my friends to choose some one else to occupy the chair for the succeeding term. There are, as you are aware, no emoluments connected with the cause of forestry at present, so that the honours at least should be distributed.

I must say that it was with more than ordinary pleasure I received word that our indefatigable secretary had been so fortunate as to secure Professor E. C. Jeffrey, now of Harvard University, for a lecture here this evening on the important subject of 'Forest Trees and their Uses,' and that His Excellency the Governor General would graciously honour us with his presence, and the Honourable Mr. Sifton, Minister of the Interior, would preside at the lecture, for from this we may infer that the forestry question, alas! far too long neglected by the government and people of Canada was at last being recognized as worthy of consideration. Doubtless many may think it strange that we should have to send to Boston for some one to tell us about forest trees and their uses, but I am pleased to be apprised of the fact by Dr. Saunders that the distinguished lecturer is one of ourselves, a true born Canadian, late of Toronto University. And those who have taken much interest in the forestry question will, I know, pardon me for saying that to the renowned seat of learning with which Professor Jeffrey is now associated this cause is very greatly indebted; for it is due to the labours of an eminent professor of Harvard University, Mr. Charles S. Sargent, Arnold professor of arboriculture, that the American people obtained the first authentic information of the condition of the United States forests, since it was under his able supervision the great work of investigation and reporting on the nature and condition of the forests of the United States for the census of 1880 was compiled; and permit me to say I believe it would have been worth hundreds of millons of dollars to the Dominion

of Canada if our government had followed the example of the United States, and ascertained the condition of our forests, when we would doubtless have discovered that we did not possess such a surplus amount of valuable timber that we could afford to sacrifice it in the reckless manner we have been doing for so many years.

In connection with this valuable report of Professor Sargent it is pleasing to note the fact that in his letter of transmittal accompanying his report to the government he mentions, in terms of high commendation, the assistance rendered him by several Canadian gentlemen, citizens of Ottawa, when he says: 'It is my pleasant duty to call your attention to the fact that this investigation has been greatly aided from the first by the experience and knowledge of Messrs. G. M. Dawson, John Macoun and Robert Bell, members of the Geological Survey of Canada. The information in regard to the distribution northward of the trees of the eastern United States is entirely derived from the latter's paper upon the Canadian forests published in the report of the Geological Survey of Canada for the year 1879-1880.' The gentlemen to whom he refers being, of course, the late Dr. Dawson, Professor John Macoun, now assistant director, and Dr. Robert Bell, Director of the Geological Survey of Canada.

This able and comprehensive report of Professor Sargent demonstrated to the world the seriously significant fact that the original great forests of the north Atlantic and lake states of the American Union, our immediate neighbours, were not inexhaustible as many ignorantly supposed them to be, but were even then showing signs of the early depletion of their most valuable timber trees—that the magnificent oaks, ashes, elms, walnuts, butternuts, chestnuts, cherries, hickories, beeches and maples, whitewood, basswood and buttonwood with other hardwood timber trees were largely cut away; while of the conifers, the incomparable white pine, the pride of the North American forests, that originally abundantly stocked the vast area of country comprising the whole of New England, together with New York, Pennsylvania, Michigan, Wisconsin, and Minnesota, as also the provinces of Nova Scotia, New Brunswick, Quebec and Ontario, and which had hitherto contributed to the lumber industry of North America fully two-thirds of its whole stock of sawn lumber, had then been so nearly harvested, that the white pine forests of the United States showed but a few scattered remnants of their once great wealth of timber which were chiefly to be found in the northern parts of Michigan, Wisconsin and Minnesota, and which even self-interest seemed unable to save from wanton destruction; while in New York, Pennsylvania and the New England States the spruce and hemlock were fast following the pine in a rapid course of depletion, that before many years the industries of the northern states would have to depend for timber supplies largely on the timber of the south and the Pacific, as outside of the great areas already cut over the vast interior of the country was either prairie and bare of timber or very sparsely stocked with valuable timber trees.

The accuracy of his prognostications are now apparent when it is known that their far-famed forests of white pine timber are about gone, for the United States census report for 1900 states, respecting the white pine: 'There is probably fifty billion feet of white pine standing in the country. The total amount reported as owned by lumbermen is 16,352 million feet, and the cut in the census years approximately 7,500 million feet, showing that the holdings of lumber companies so far as reported are sufficient to supply the cut for two or three years only.'

Three years have gone by, and estimating the cut of white pine timber since 1900 at even five billion feet annually, would leave standing in the United States forests barely thirty-five billion feet of white pine timber, an amount just equalling the sawn lumber manufactured from all kinds of timber during the census year 1900, which was 35,084 million feet (including, of course, the 7,500 million feet of white pine), as compared with 12,755 million feet cut in 1870, 18,091 millions in 1880, and 27,041 millions in 1890. The cut of 1900 being, as it appears, nearly three times as much as that of 1870; while the total value of all forest products increased from sixty million dollars in 1850 to ninety-six millions in 1860, 210 millions in 1870, 233 millions in 1880, 437 millions in 1890, and 566 millions in 1900.

The United States census returns for 1900 also show, as was predicted by Professor Sargent, that the northern states have now been forced to draw heavily upon the forests of the south and the Pacific for lumber and other forest products, for we find that fourteen southern and three Pacific states, which in 1880 supplied forest products to the value of but fifty-one million dollars (a sum less than that of the single state of Michigan, which exceeded fifty-two million dollars in 1880, and eighty-three million dollars in 1890), exceeded this amount in 1900 by just 200 million dollars, their total value being 251 millions, or five times as much as in 1880. The increase in some states being very great, advancing in Arkansas in the south from $1,793,848 to $23,958,983, and in Washington in the west from $1,734,742 to $30,286,280. The increase in the amount of lumber sawn being from 3,686 millions to 14,743 millions in the south, and from 642 millions to 3,900 millions in the Pacific states, making the total amount of lumber sawn in the south and the Pacific 18,643 millions in 1900, as compared with 4,328 millions in 1880; showing that the amount of lumber sawn in the south and west for the census year 1900 was in excess of the entire cut of all kinds of lumber manufactured in the United States in 1880, and considerably more than one-half of the total amount of lumber sawn in the United States in 1900.

The cut of southern yellow pine timber (including about 1,000 million feet sawn in the west) reached a total of 10,603 million feet, as compared with 7,483 million feet of white pine, 3,420 millions hemlock (1,860 millions in the north-eastern states, and 1,560 millions in the west), and 1,448 million feet of spruce. The southern pines and Pacific fir almost exactly equalling the cut of white pine, hemlock and spruce, the former being 12,339 millions and the latter 12,351 million feet; so that it is but reasonable to assume that the cut of southern pine to-day largely exceeds the whole cut of white pine, hemlock and spruce, and by the time another census year comes around the lordly white pine, that heretofore dominated all other timber trees combined in its production of lumber, will have disappeared from the census enumeration as an important factor in lumber production.

This is an object lesson that should be seriously considered by us, for I greatly fear a critical examination of our Canadian forest lands would show that we too have been running a close race with our neighbours in the rate of forest, and especially white pine, destruction.

I may remark that it was a recognition of the unsatisfactory condition of the forests of the United States, as shown in Professor Sargent's report, that prompted the Forestry Association of the province of Quebec, at its first meeting, which was held in Montreal,

November 8, 1883, under the presidency of Sir Henri Joly de Lobinière, to memorialize the Dominion Government praying that a parliamentary inquiry might be made into the condition of the forests of the country, especially those of white pine, and it is safe to say that a correct knowledge of their condition would have saved the country hundreds of millions of dollars worth of valuable timber, since sacrificed through ignorance and indifference, by the too reckless cutting by the axe, and loss through destruction by fire. And since this is directly in line with the aims of this Association, I now take the liberty of reading this memorial and the reply thereto.

To His Excellency
The Marquis of Lansdowne,
Governor General of Canada.

MAY IT PLEASE YOUR EXCELLENCY—

The undersigned has the honour to represent to Your Excellency that at a meeting of the Forestry Association of the Province of Quebec, held at Forestry Chambers, Montreal, on the 8th ultimo, the following resolution was passed :—

'That a committee be appointed to memorialize His Excellency the Governor General on the subject of the forests of the country, with the view of having a Parliamentary inquiry made into their condition, especially with reference to the white pine, respecting which it is said that there is now a growing scarcity of the merchantable or first quality pine,a description of wood on which the prosperity of the country has greatly depended.'

That the chairman be requested to name the committee who shall be authorized to make what representations, inquiries or suggestions may to them seem requisite.

That the chairman named the following gentlemen on the committee : Messrs. William Little, L. H. Massue, M.P., J. K. Ward, J. X. Perrault and G. L. Marler.

That the undersigned was made chairman and requested to submit to Your Excellency the above recited resolution for your favourable consideration.

That in submitting this resolution your memorialists would respectfully intimate that though the question may appear to fall within the jurisdiction of the Provincial Legislatures rather than of the Dominion Parliament, yet it will only be by means of a general and uniform inquiry into the condition of all the forests of the Dominion as a whole, that a correct appreciation can be made of the condition and prospects of the timber trade, one of the most important in the Dominion.

That as the question is one of general interest to the whole Dominion, it is humbly submitted that it could be more satisfactorily dealt with by the Dominion Parliament than by any Provincial Legislature, which could not be expected to enquire much further than its own limits.

That the question is one of the most serious import for the future welfare of the country and worthy of special investigation, in view of the statements made by observing men, that the forests are being sacrificed at an alarming rate, particularly the fine forests of white pine, to which your memorialists were more especially asked to draw Your Excellency's attention.

That the early exhaustion of supplies of this invaluable timber (which your memorialists are advised may with confidence be predicted, unless better methods than now prevail be adopted for its conservation) or a material reduction thereof would be productive of great loss to the country.

That your memorialists have tried to obtain for Your Excellency's information some reliable statistics on the subject, but regret to have to say that with the exception of the valuable reports of the Hon. H. G. Joly, of Quebec, as member of the Dominion Board of Agriculture, compiled for the Department of Agriculture ; the map prepared by Dr. Robert Bell of the Geological Survey, showing the geographical distribution of the forest trees of Canada ; replies to questions in relation to the woods and forests of Canada, submitted through the Right Honourable the Earl of Carnarvon ; Report on Forestry and Agriculture by the Ontario Agricultural Commission, 1881 ; Reports of

the Geological Survey; Census Reports and Departmental Reports, published by Parliament—but little authentic information can be presented, and what little there is, though valuable in itself, Your Excellency will no doubt perceive only shows cause for a more thorough investigation of this most important question of timber supply.

That your memorialists cannot too urgently impress upon Your Excellency's attention the great importance of forest conservation, nor the disastrous effects which may be anticipated from too limited areas of forest reserves.

The whole respectfully submitted,

(Signed) WILLIAM LITTLE,
Chairman of Committee of Forestry Association,
Province of Quebec.

FORESTRY CHAMBERS, MONTREAL, Dec. 10, 1883.

[REPLY].

OTTAWA, December 13, 1883.

SIR—I am directed by His Excellency the Governor General to acknowledge the receipt of your communication on behalf of the Committee of the Forestry Association of the Province of Quebec, and of its inclosures, and to inform you that it has been transferred to the Honourable the Privy Council for consideration.

I have the honour to be, sir,
Your most obedient servant,

(Signed) MELGUND,
Governor General's Secretary.

WILLIAM LITTLE, Esq.,
Chairman of Committee, For'y Assn. of Quebec,
Montreal.

With regard to this memorial, I have to say that I am yet ignorant of any serious consideration having been given to it by the Government of the time, or of any rational attempt having been made by any succeeding Government, to ascertain the true condition of our forests of white pine, which is the chief factor in our great Canadian timber trade, though from what information I have on the subject I am forced to believe that, if the existing indifference continues for a few years more, the inquiry, in so far as regards our white pine forests, may be answered in as few words as the school boy's essay on the snakes in Ireland, which said: 'There are no snakes in Ireland,' for there will be no white pine forests in Canada.

The minutes of the previous annual meeting were read by the Assistant Secretary and adopted.

MR. STEWART read the following telegram from His Honour Sir Henri Joly de Lotbinière as follows:—

'Best wishes for successful meeting, regret cannot attend. James Leamy sends paper protection of forests against fire.'

MR. CAMPBELL—Mr. Chairman when this meeting was being arranged for, a short time ago, I thought it advisable to write to the president of the Board of Trade of the city of Ottawa asking that he and the members of the Board of Trade should take

some interest in this meeting. I have a reply from the secretary, Mr. Cecil Bethune, which is as follows :

DEAR SIR :—At a meeting of the council of this Board held last evening the following resolution was passed :—

'That the council of the Board of Trade of the city of Ottawa, acknowledges with thanks the letter of R. H. Campbell, Asst. Secy. of the Canadian Forestry Association accompanied by the last annual report and the by-laws of the Association, and is pleased to know that the annual convention will assemble in Ottawa this week, and expresses the hope that its several sessions may be eminently successful.'

The citizens of Ottawa generally should take a lively interest in this praiseworthy Association, whose aim is to advocate the protection and the proper management of the forests of the Dominion.'

I have a communication from the Revd. Father Burke, Prince Edward Island. We have no representative here from the Island to-day, and in fact Revd. Father Burke is the only member of the Association in Prince Edward Island. He has written me a letter expressing his interest in the work, and asking that we should take some more active steps to help them down in the eastern part of Canada. Father Burke is a member of the Fruit Growers' Association there, and at the last meeting he induced them to pass a resolution, a copy of which he has sent me. It is to this effect :

Moved by John Johnston, Esq., Long River, seconded by Richard Burke, Esq., Charlottetown,

Whereas the proper protection of our forests is a matter of vital importance to the agricultural interests of the province, therefore

Resolved, That the Government be and is hereby requested to appoint without delay a commission to look into and report on this important matter before it is too late, with a view to the conservation of the forest growth on our waste land and the extension of forestry generally.—Carried unanimously.

The resolution was carried unanimously. Father Burke is very anxious that we should hold a meeting in Eastern Canada, so as to assist them in the work there.

I have another communication that is partly of a pleasant character, but has another feature which shows some of the disabilities we have to labour under. It is from Col. Warren of Vancouver, and reads in part as follows :—

I have to inform you that while fully aware of the good which can be accomplished and has been already accomplished by the Canadian Forestry Association, I am so satisfied that the inequality of treatment accorded to the British Columbia members as compared to others, can be and should be amended.—I allude to the railway rates to attend meetings,—that I shall discontinue any further subscription until equality is awarded to all members alike.

Col. Warren requests that this letter be read before the Association. I explained to Col. Warren in reply, that we did not control the railway companies. We got all the privileges we could from them, but they would not extend the single fare privilege beyond Fort William on account of traffic arrangements and other objections, although we made every effort to have it extended. I suggested to Col. Warren that it would hardly be a proper thing for the Association to refuse a privilege accorded, because we

could not get all we wished to obtain, and I said that we would still try to get the further privilege.

I received a telegram from Mr. J. C. Anderson, Deputy Minister of Agriculture of British Columbia, asking that certain matters be brought before the Association. But the papers that he has forwarded have not arrived yet, so that we may defer that matter to see whether they arrive.

MR. STEWART read the Annual Report of the Board of Directors as follows:—

REPORT OF THE BOARD OF DIRECTORS.

The board of directors of the Canadian Forestry Association beg to submit their third annual report.

Immediately after the last annual meeting the following appointments of vice-presidents for the provinces and districts were made:—Hon. Sir Louis Davies, Prince Edward Island; A. H. MacKay, LL.D., Nova Scotia; His Honour J. B. Snowball, New Brunswick; Hon. S. N. Parent, Quebec; J. B. McWilliams, Ontario; Major Stewart Mulvey, Manitoba; The Lieutenant-Governor of Manitoba, Keewatin; J. S. Dennis, Assiniboia; P. G. Laurie, Saskatchewan; Wm. Pearce, Alberta; F. D. Wilson, Athabaska; H. Bostock, British Columbia.

The report of the annual meeting was issued and distributed as usual, and in this connection your board wish especially to call attention to the kindness of the Department of the Interior in providing for the publication of such a large number of these reports without expense to the Association.

The membership now stands as follows:—

Provinces.	This year.	Last year.
Nova Scotia	10	6
New Brunswick	10	9
Prince Edward Island	1	1
Quebec	34	28
Ontario	128	117
Manitoba	78	73
Assiniboia	15	17
Saskatchewan	4	4
Alberta	81	58
British Columbia	17	16
Yukon	1	2
United States	17	15
England	3	1
Germany	1	1
Total	400	347
Life members	9	9

The revenue for the year was $580.17 and the expenditure $474.02, leaving a balance of $106.15.

The committee appointed to consider methods for increasing the membership and the arrangements for an official organ met after the annual meeting and formulated certain suggestions, which were referred to the board.

In regard to the suggestions as to plans for increasing the membership, it has been impossible for the secretary or assistant secretary, owing to the large amount of clerical work which would have been involved, to carry them out fully. Efforts have been made, however, in the direction indicated, and have resulted in the addition of a number of members, who will add much to the strength of the Association. The Deputy Minister

of the Interior has kindly assented, at the suggestion of the board, to an arrangement which it is hoped will help to overcome to some extent the difficulties which have hampered the extension of the work. If the Association is to have that expansion which will ensure its sucess, and is to reach those whom it wishes to influence, it is clear that its work must be developed on larger and broader lines than those which, up to the present time, have been possible of adoption. It is desirable that meetings should be held in different parts of the Dominion, and that the officers of the Association should, in this and other ways, have the opportunity of coming into more direct contact with those who might be induced to give their assistance, so that the Association may be established on a firm and broad basis both in numbers and influence. This question is worthy of the fullest consideration by the members of the Association.

Another matter referred to the committee mentioned was the official organ, and the board have had the subject under consideration for some time. The arrangement formerly entered into with *Rod and Gun in Canada* was continued during 1902, but in order that the annual meeting might have a clear field for action, an alternative arrangement was concluded for the present year, which may be terminated at the end of three months or may be continued for the twelve months. For calling attention distinctively to the Association and as a medium of communication amongst its members there is no doubt that a publication devoted solely to the interests of the Association would be most satisfactory, but there are two main difficulties in the way at the present time.

The first is financial. The issue of a publication such as would properly represent the Association would involve a larger expenditure than our somewhat slender income would permit of. Your board considered it advisable, in view of the importance of this step, to make application to the governments of the different provinces for financial assistance, and, although no definite statement can be made at present, it is expected that in this way this difficulty may be largely solved.

The second difficulty is in regard to the editorial work. Forest management is a new study in Canada, and to maintain steadily throughout the year the high class of articles which would be required for such a publication will be no easy task. It will necessitate a more thorough organization of the editorial staff and the active co-operation of all who are interested in forestry.

In accordance with the instructions contained in the resolution passed at the last annual meeting on the question of a proper division between agricultural and non-agricultural lands, a copy of the resolution was sent to the governments of each province and also to the Dominion Government, and replies were received thanking the Association for the suggestions offered.

Owing to the wet summer throughout the whole of Canada east of the Rocky Mountains, forest fires have, fortunately, not been numerous or destructive. Those which did occur during the earlier and drier part of the season show that the danger is still ever present, and that no relaxation can be permitted in the efforts to maintain and increase the effectiveness of the fire preventive service. This is strongly emphasized by the loss that has occurred in the Western United States, particularly Oregon and Washington, where half a million acres were fire-swept and the loss totalled up to about twelve million dollars. Contrasted with this the effective prevention work done in the railway belt in British Columbia, part of it contiguous to the burned area in Washington State, with a comparatively small staff, is a subject for congratulation.

Advance in British Columbia is marked by the adoption by the legislature of the amendment to the penalty clause of the Bush Fire Act as suggested by this Association, and the setting apart of Long Lake Timber Reserve and Yoho Park in the Railway Belt, the latter of which, with the Rocky Mountains Park of Canada on the eastern slope of the Rocky Mountains, which has been extended to include an approximate area of 2,280,000 acres, form one of the most magnificent forest parks in the world and one of which Canadians may well be proud.

The setting apart of forest reserves is a decided step forward, but the question of their administration is one that is far from being finally determined. The province of Ontario during the past year formulated regulations for the administration of its

reserves, but these regulations did not deal with the cutting of timber for lumber purposes, and it seems advisable that this subject should be fully discussed by this Association in order that the governments may be assisted in determining the proper policy to be pursued.

At the last session of the legislature of Quebec a commission was appointed to inquire into forestry and colonization. Unfortunately, through uncontrollable causes, this commission became disorganized and it has been necessary to reconstruct it. It is sincerely to be hoped that a fair and thorough examination on the lines laid down for this commission will be made by the province of Quebec, for in the proper adjustment of the relations of these two interests lies one of the most important problems that the province has to face, and one which will have a far-reaching influence on its future prosperity.

In the province of New Brunswick an Act has been passed authorizing the setting apart of a forest park, but its location has not as yet been determined.

In the province of Nova Scotia information is being gathered as to the forest lands under control of the Crown, and it is altogether probable that some important advance in the administration of Crown lands will be made in the near future.

The work of co-operation with the farmers in forest tree culture on the treeless prairies of Manitoba and the North-west Territories, which was started a couple of years ago by the Department of the Interior, is now assuming large proportions and promises to prove very successful. Besides about seven hundred pounds of maple and ash seed, there will be distributed this spring over 900,000 trees to 627 farmers. This gives an average of over 1,400 trees to each farmer, and the applications received from those desiring to have their farms visited by the supervisors next season with a view of obtaining trees the following spring are more than double that number. The total distribution when this spring's supply is furnished will be 1,424,800 trees and 1,400 pounds of maple and ash seed. The reports received from the supervisors of the condition of the trees planted in the spring of 1901 and 1902 were very satisfactory both in the Province and the Territories.

The Winnipeg Forestry Association submit a resolution passed at a meeting held in March of last year, asking that the members of that association be allowed membership in the Dominion Association on payment of an annual fee of fifty cents only, for each member, the remainder of the fee to be retained for the expenses of the local association. While the fee for membership in this association is placed at as low a figure as is at all reasonable, it may be worthy of consideration whether the encouragement of such local associations would not be finally for the benefit of the Dominion Association and the developing of a wider interest in forestry, and whether it might not be advisable to make some arrangement that might meet the difficulty which has found formal expression in the resolution of the Winnipeg association and lead to a closer connection between such local organizations and the Dominion Association.

The growing interest in forestry is evidenced by the recent action of Queen's University in arranging for a series of lectures on this subject during the month of January, by Dr. E. B. Fernow, Principal of the New York State College of Forestry. These lectures were well attended and have done much to awaken the public to the importance of the question. The interest aroused has culminated in a resolution to place forestry among the regular subjects of instruction in the college curriculum.

The University of Toronto has also been taking steps looking towards the establishment of a chair of forestry.

From the utterances of the government of the province of Ontario, it appears that it has been decided to give such financial assistance as will lead to the inauguration of a school of forestry. This action should receive the hearty endorsation of the Canadian Forestry Association, for the demand for a more scientific knowledge and management of our forests is growing, and it is only just that what has been done in the direction of education for agriculture and mining, should also be done for forestry, which is capable of becoming a science of the greatest exactitude.

The Association is to be congratulated on the hearty response with which its efforts in the cause of forestry have been met by the public throughout the country, and your

board desire again to tender thanks for the liberal assistance they have received from the railway companies of the country in granting free return passage to the delegates attending the annual meeting. They have also been greatly aided by the kindly recognition given to the work by kindred societies, both on this continent and Europe, and also by the press in all parts of the country.

THE CHAIRMAN—There is one point in the report that will require consideration, and that is in relation to the suggestion to grant the privilege to other societies to become members of this Association at a reduced fee.

Mr. STEWART—I think the better way would be to refer that report along with any other reports that may be presented to a committee to deal with. I think we would get on better if we should do that and let it come up for discussion later on. It appears to me that if we appoint a committee to take up the question we will save time.

Dr. SAUNDERS—I think the whole matter might be left to the directors of the Association, who perhaps understand the position of affairs more fully than any committee appointed outside. I would move, in order to get the sense of the meeting, that this report, as far as that part of it is concerned, which relates to the admission of sister societies, or provincial societies, at a reduced fee, be referred to the directors to be determined as they think best.

Mr. STEWART—There are several matters referred to in this report that I think should be pronounced upon by the meeting. When I was in Winnipeg this question of their being allowed to come in without paying the full fee was spoken of. They have a local association there; I told them that I could not see very well how we could do anything of the kind. They did not want *Rod and Gun* and they were paying fifty cents a year for *Rod and Gun*. I said it might be mentioned at this meeting that we would allow them to forego the privilege of taking *Rod and Gun* and let them come in for fifty cents. I did not promise anything, except that I would bring it before the meeting and that it should be decided upon. There are other matters that might be left to the committee on resolutions, and I would move that this be referred to the committee on resolutions which can be struck later.

Dr. SAUNDERS seconded the motion.

Mr. HIRAM ROBINSON, Ottawa—It may be well to have an expression from this meeting in regard to some points in order to help the committee to come to a conclusion rather than to leave the matter entirely to the committee. If we could get some expression from the meeting to help the committee, I think it would be well, and to this end I would suggest that any gentleman who has anything to say on the subject should now give expression to his views.

Mr. GEORGE JOHNSON—Mr. Chairman, nobody knows what the report contains. I heard little of it. This room is not a good one for speaking in apparently, for it was only occasionally I could hear what the secretary said, but that difficulty would be obviated if these reports were printed in advance so that each one might have a copy and then we would be in a much better position to discuss what the report contains and give that intelligent assistance to the committee of which Mr. Robinson speaks. At the present time I certainly do not know what the subject is.

Dr. SAUNDERS—In regard to the question of admitting other societies at what appears to be a very small fee, I might say that great success has attended the Ontario Fruit Growers' Association by the adoption of that method. They have adopted the method of accepting half the regular fee of a dollar—that is fifty cents—from the members of all horticultural societies in the province of Ontario, and the result is that their membership has gone up to over 4,000, and while they give to each member in the 'Canadian Horticulturist' more than the equivalent for the fifty cents that is received, yet that gives them a considerable hold on the legislature for an increased grant to make up the deficiency, because the interest in the work is extending, and there is more good being done among the poople, and after all I think the legislature are prepared to deal generously, if the subject is properly presented before them. I do not think we should consider this in any narrow way at all. It is a matter of very little consequence to the Association whether they give to any of their affiliated members more than they receive from these members provided the great interests of forestry are promoted by the means that are taken for that purpose, and provided a more intelligent interest is taken by the community in general in the subject.

MR. CAMPBELL—Perhaps, bearing on this question, I might refer to a communication I mentioned before from the Winnipeg Forestry Association. They sent a copy of the resolution that has been referred to by Mr. Stewart, and I asked them to let me have a list of the members of their association. I will just give the information as it may be useful. There are five members who have paid their fees to the Dominion Association for the past year, there are five who were previously members of the Dominion Association who have not paid their fees for the past year, I suppose, expecting that this resolution would be adopted by this Association and they would only be required to pay a fifty cent fee. Then they have nine new members altogether who have never been connected with our Association. So that the membership would be 19 in their association, whereas, we had 10 out of that number who had at one time belonged to the Dominion Association.

Prof. MACOUN—There are two points in this discussion ; one is the financial aspect. You may notice that the Winnipeg people are looking forward to getting a grant from the Manitoba government. The rule is that when one section makes a break another section follows suit, and it will not be many years before we have a forestry association in each province and the legislation that we may enact now will be standing before us either in our favour or against us in the future, therefore, I think it is our duty to look at the matter from that point of view. But, there is this question, as you will see by the report, the question of an official organ for the society, that is an organ purely belonging to our society, not affiliated with *Rod and Gun* or any other paper. Now, if these provincial societies that I am saying in the future will get provincial grants from the provinces will give us a part of their grants in the form of say 50 cents a year towards the publication of a paper for our society, why then, the scheme is plain. We can have a first-class organ, we can have increased membership, we can have practical men all over the Dominion working locally, and in the central association unitedly, in another sense, so that when we take up the matter, if we make it right at the start, it would be a grand thing. I believe, with Mr. Johnson, that the report should be put in such a shape that a copy of it could be in the hands of the members of the Association. It could be easily done. I hold in my hand the report in typewriting. We could get

some one to typewrite 20 copies so that by tomorrow afternoon it would be in the hands of all, and we would have an opportunity of looking over it. This is an important question.

Mr. STEWART—I beg to move that the following be a committee on resolutions: Mr. Hiram Robinson, Dr. Saunders, Mr. Thomas Southworth, Mr. George Johnson, Mr. R. H. Campbell, and the mover, to report at this meeting. We can refer this subject to the committee. There are many matters to consider. I remember that two years ago we had such a committee and it did good service. It can do no harm and the report will come up before the meeting and then it can be discussed.

Dr. SAUNDERS—I second that, provided the name of the mover be added to the committee.

Mr. STEWART—The mover's name is there.

Prof. MACOUN—If that committee is appointed, I want to say that in my opinion my idea expressed a few minutes ago is an important one, and that if the committee gets this matter into its hands and fools away with it a day and a half it will not come before the general meeting at all to-morrow afternoon. That is the question. There is no use of shelving the thing. Will your resolution shelve the remarks I made in connection with getting the report into the hands of the members by to-morrow afternoon? If it does that I am opposed to it totally.

Mr. STEWART—I do not want to have anything shelved. I am anxious to deal with it the best way I can, and I can easily understand that if the members had the report in their hands they would certainly be in a much better position to discuss it. I cannot say whether I would undertake to have this report printed in sufficient numbers for everyone that may be here, but if the meeting wishes it I will endeavour to get my typewriter to make as many copies as he can by to-morrow or for the meeting of the committee. In reading the resolution I thought I had read Prof. Macoun's name. I intended Prof. Macoun to be on that committee, and he is on it. In addition to the names I mentioned is that of Prof. Macoun. I believe the city papers would publish this report if we asked them, and it would come out in the evening papers or to-morrow morning.

Mr. E. G. JOLY DE LOTBINIÈRE.—I am in sympathy with Prof. Macoun in the opinion that every possible facility should be given to members to discuss this matter, as far as preparing copies of this report for to-morrow so that we might be in a position to appoint a committee with copies before them is concerned. I should think that if the matter was put into the hands of any printing establishment in Ottawa there would be no difficulty in rushing through the necessary number of copies for to-morrow morning.

Mr. JOHNSON.—There will be no difficulty at all in getting it printed. I can undertake to get half a dozen copies printed. There are others connected with the departments who could do the same. In two hours we could get all the copies that are needed. I will undertake to get four. The thing ought not to have come in the form in which it did. I want to know what is going on, and I cannot tell until I read the report. You cannot tell anything about the report when you do not hear the whole of

it. If we want intelligent action we should have everything in such a form that each man could pick it up and deliberate upon it by himself.

Mr. CAMPBELL.—I think the idea of Mr. Stewart's committee is that they should take up all matters that are referred to in the report and submit such resolutions as they think should be passed at this meeting to be discussed at a later time. The idea is to lay before the meeting a set of resolutions so that we will not have to draft them in the meeting and waste time. I can undertake to have as many reports as you require.

TREASURER'S REPORT.

Mr. CAMPBELL presented the Treasurer's report showing receipts, $580.17, and expenditure, $474.02, leaving a balance of $106.15.

Dr. SAUNDERS moved that the auditors Messrs. Geo. Johnson and J. M. Macoun be reappointed for the ensuing year.

Motion agreed to.

Mr. STEWART moved, seconded by Prof. MACOUN, that the Treasurer's report be referred to the auditors for examination.

Motion agreed to.

Mr. CAMPBELL.—The next order is inquiries and notices of motions. Those of you who received the circular calling the annual meeting will see that a clause was put in stating that a motion would be introduced to change the date of the annual meeting. My reason for putting that in was that the Canadian Mining Institute meets at the same time as this Association does, and one member at least of the Geological staff spoke to me about the matter. He said that while the members of the Geological staff were anxious to attend the meetings of this Association, they were more directly interested in the Mining Institute and gave that the first place. I thought we could make a change in the date of our meeting very easily that would avoid any clash with the meeting of the Institute and thus permit more members of the Geological Survey staff to attend our meeting. Therefore, I propose:

That in the second line of Clause VII. of the Constitution the word 'second' be substituted for the word 'first.'

Thus making the annual meeting on the second Thursday in March instead of the first Thursday. This is a notice of motion only, and the motion will be submitted later.

FORESTS OF NEW BRUNSWICK.

His Honour J. B. Snowball, *Lieutenant Governor at New Brunswick.*

The subject given me to deal with is Forestry in New Brunswick. In forestry proper there is nothing whatever being done in the province, beyond the work of a few wood rangers, whose duties it is during two or three summer months to protect the forest from fires or rather to prevent settlers from burning their newly cleared land in these the most dangerous months for fires.

Such fires on several occasions have been very destructive. The Saxby Gale (known as such) which occurred in October, 1869, swept across the province and blew down a section of well timbered forest on the tributaries of the south-west Miramichi river, forty to fifty miles long by fifteen miles wide. The following year fire got into it, and the whole district was burned over. For some reason this district has been unfortunate, as it has again been burned over since 1870, and the fire attributed to carelessness of settlers. Spots were missed both by the blow down and subsequent fires, these spots being mostly hardwood ridges. The lumber blown down and burned consisted largely of rough pine, and was all Crown lands. The loss to the province and district of this large section, over 700 square miles, is not less than a quarter of million dollars annually, and the loss must continue unless some system of reforesting and better protection is adopted.

All woods natural to our soil are manufactured and utilized for export. There is very little hardwood square timber exported from this province. This wood is now mostly sawn into deals, furniture squares or spool-wood squares and shipped in contract sizes. The cedar is manufactured into shingles and exported largely to the United States. There is very little pulp wood shipped. It is manufactured within the province and shipped as pulp. The export value of the above commodities including spruce and pine deals is estimated to amount to ten million dollars per annum.

There are different computations by various authorities on the area of the province of New Brunswick, but it may be stated at 28,200 square miles ; or a little over 18,000,000 acres. About two-thirds of this, or 12,000,000 acres is forest lands. Of this forest area about 60 per cent is estimated to be spruce land, 10 per cent pine, 5 per cent hemlock, 5 per cent cedar and 20 per cent hardwoods, which latter consist principally of birch, beech, ash and maple.

For comparison I would repeat :—

New Brunswick has	12,000,000	acres of forest lands or	18,750	sq.
Norway & Sweden "	58,000,000	" "	90,625	"
Russia in Europe "	527,427,000	" "	824,104	"
The forest area of Europe is	687,000,000	" "	1,073,000	"

42 p.c. of Russia in Europe is under forest.
40 " Sweden "
24 " Prussia "
22 " Norway "
32 " Austria "
16 " France "

Every country of Europe has a large area of forest lands excepting Great Britain, that has less than 4 per cent. All these countries are seeking more or less legislation looking to the protection of their forests and the replanting of their denuded areas. Germany has taken the lead in wise forestry administration, and most of other European countries have established Forestry academies, and now conservation of wood lands occupies prominent and studious attention.

The area of New Brunswick inland waters including rivers and lakes is about 400 square miles, and the salmon trout and other fishing on these waters is said to be equal to the best in the world. The forest lands of the province also cover one of the best game regions of North America, considered from the sportsman's standpoint of accessibility from railways. Trappers also find New Brunswick forests rich in fur-bearing animals.

Persons desirous of settling on Crown lands of the province, whether they are immigrants or residents, may acquire grants thereof, either under the Labour Act or by cash purchase. Under the Labour Act one hundred acres may be obtained for the performance of thirty dollars worth of work on the roads, or a payment of twenty dollars cash in lieu thereof, the clearing and cultivation of ten acres of land, the building of a habitable house 16 feet by 20 feet and the continuous residing therein for three years. The words 'continuous residing' are liberally construed, and under the law the settler may be absent from his holding for certain months in the year, to enable him to engage in wage-earning occupations.

A Report on the Conditions of Lumbering and Forestry in Western Nova Scotia.

F. C. Whitman, Annapolis Royal, N.S.

About two years ago the subject of forestry was taken up by the local boards of trade in Nova Scotia, and resolutions were passed favouring government action that would awaken the public to the value of the present forest growth, the necessity of protection from fires and advocating reforestation. The matter has been taken up by the press and considerable interest shown the movement, but up to the present time nothing further has been done. The writer can only present in a very humble way the general conditions of the timbered areas in Western Nova Scotia. From the days of the first discovery of St. Mary's Bay and the Annapolis Basin, and the settlement at Port Royal in 1505 the province has been noted for its forests. The growth was so dense in early days that it was over 200 years before any roads were cut through it; and the early settlers in going even to nearby settlements had to depend on a single file path for foot or horseback travel. It prevented in fact any opening of the back country, and the settlements attempted proved failures. The occupied part of the country was the fringe following the salt water of the coast and along the numerous rivers. The first trading was with the New England States, but exports of wood were very limited, then later a trading interest was developed with the West Indies, and lumber was exchanged for sweets. The export to the West Indies still continues, and as other markets developed the cutting of the forests became general. Every river and log-driving stream was followed to its source, and as the lower timber was cut away loggers from the Atlantic side driving on the La Have and Port Medway met and passed the loggers driving into the Annapolis River and the Bay of Fundy. All this western country from La Have and the headwaters of the Annapolis River to the Cape was a lumberman's paradise for timber, and accessible by lake, stream and river for every tree that grew. Fifty years of steady cutting, followed in so many instances by fires that sometimes burnt to bedrock, presents to-day a sorry spectacle of waste and too often absolute desolation. It was waste because the timber was cut in most instances to the last available stick that was standing and thought merchantable, and fires allowed without any restriction, except a fortunate summer rain, to finish what the axe had failed to thoroughly accomplish. It would seem that the man who conducted lumbering operations had but three ideas: to get all in sight, leave nothing for the next man, and move on to some other place. Now it has arrived at a point where those who move can find no new ground in Nova Scotia, and within the past year provincial operators have gone north to Newfoundland and Labrador, the latter venture being a sealed book until the spring is well advanced.

To give an idea of how the forests were so wantonly cut away it is necessary to take up the matter of titles to the land. The original settlers chose of course the

valleys, and secured grants of large areas subdivided later into lots. A characteristic holding would be a river frontage of a few chains or rods, and running usually on north and south lines include a meadow or marsh next the river of level land, next the home farm and roadway, then a clearing running back on higher ground to timber. Some of these farms remain almost on original lines having a depth of several miles. The settler cut his way to civilization with the axe and by fires, and in these later days what he was unable to do himself in clearing land of forest growth has been done by portable mills, which usually cut without any restrictions. These small portables move from one place to another for a cut of a few thousand feet, and will probably continue to do so until it is unprofitable. Outside of these individual holdings was a large body of timber in the interior divided by a water shed running east and west. The government made generous grants to anyone who applied for this land, and the larger operators took possession of all but a few thousand acres that still remain Crown lands. When cutting first began spruce, hemlock, and hardwoods were scarcely touched, it began on the white pine until to-day it is commercially gone. The cutting of the spruce followed and is still going on at the rate of 100,000,000 feet annually in this district. The pulp mills are eating up the small growth, and the saw mills cut from 1 inch x 2 inches up. There has been for many years past a very large export to South America of 1 inch x 3 inches and up, 2 inch x 3 inches and up, which also takes small and young growth wood. These South American orders call for a proportion of 12 inches wide stock, and great difficulty is now found to secure the proper proportion. The character of the cut of wood, and the increasing value of spruce lumber is tending toward absolute denudation. I believe that it is opportune to undertake a movement in the study of forestry, and that an appeal to the people in the interests of the country would lead to a betterment before it is too late. The producing farm lands lie in the valleys. The foot hills and the vast interior, although no longer a forest primeval, will always be more suitable for wood growth than for any other purpose.

The standing timber in the order of commercial values would be as follows :—

White Pine.—Nearly all cut; young growth scattering.

Spruce.—Old growth confined to holdings of large operators and in scattering bodies on farm lots or remote sections. Young growth luxuriant everywhere, and will come to a size fit for commercial purposes in 30 years from breaking ground.

Hemlock.—Abundant in many sections, now being cut where easily accessible; largely used for railway ties; bark wasted.

Fir.—Trees die early; much affected by insects. Used for cooperage.

Poplar.—Quick growth, but sound; stock small in size, scattered through low lands or hillsides along stream. Used for pulp and staves.

Elm and Cedar.—None.

Birch, White.—Abundant.

Birch, Yellow.—Abundant.

Birch, Redheart.—Scarce.

Maple.—Rock and softer kinds abundant, scattering birds eye.

Beech.—Abundant.

Oak.—Scattering, growth according to elevation; mostly red oak, coarse open grain. Used for car building.

Ash.—Very scattering, kept under by basket and hoop makers.

All the hardwood grows mixed and would only pay to cut as it runs.

White pine was largely used for ship building. The butt was often used and the top wasted, as can be seen in nearby woods to-day. Spruce and all the hardwoods are now used for ship building, and the fishing fleet annually takes a very large quantity. It will be noted particularly that a northerly slope produces the better timber, having a brighter foliage and a heavier growth. Where the timber has been cut away on a southerly slope, and fires have occurred, the soil has lost its fertility and the new growth is very sparse. In many cases so unsatisfactory do the conditions appear that it might be considered waste land. As an instance of growth: In going to a favourite fishing pool in September the writer, in going along a well-trodden path, had to step aside to pass a young poplar that had sprung up and grown over eight feet in that one season.

There were no signs of this tree on the same path in the spring. In 1902 a graft of russett apple, considered to be the slowest grower of any of the fruit trees, grew 6 feet 8 inches. It was grafted on wild stock. Lumbermen who have been careful to cut spruce not less than 14 inches at the stump say that it will give them a cut every ten years, and the second cut will be better than the first. (In Cumberland county, at the head of the Bay of Fundy, the growth is more vigorous, and they can cut every seven years. Two thousand to two thousand five hundred acres will produce a paying annual cut, and the value of the whole be maintained with systematic cutting.) One reason for this is that the Western Nova Scotia forest area is overgrown in the number of trees, and the soil cannot support the growth unless thinned out. Both hardwood and spruce have an early maturity, and once past that point rapidly deteriorate. The soil is not rich and in many places does not retain sufficient moisture to keep the old growth sound.

A good deal of wood is cut for fuel, but if the actual wage and time were reckoned for the firewood that is brought to market it would be found that the work had been done at a loss. Fortunately for those who can buy it, time is not the essence of the contract with some Nova Scotians, and they are able to warm their toes at the expense of another's hands. Lumber values, however, are steadily increasing, and within the past ten years the price of spruce has advanced 35 per cent, while the increased cost of lumbering is about $1.00 per thousand more than in former years. The country named is not subject to violent wind storms, and little damage is done by winds except to hardwood on exposed hills. There is an impression that the annual fall of rain and snow is decreasing, but the lack of sufficient water for driving logs, and the disastrous spring floods, may possibly be traced to the clearing out of timber along the water courses, so that snows melt rapidly in the spring, and the land does not hold the moisture that it did in early days. The extending area of farms in the Annapolis Valley, and the clearing of wood from the foothills is very apparent every ensuing year, in fact, bad land cracks and even wearing away of the soil is observable on the south slope of the North Mountain. The past season many wells have been dry for months and some have not been filled after the autumn or winter rains. If forest growth will conserve moisture it is time for farmers as well as lumbermen to interest themselves in forestry. I regret this article is mainly about conditions. It is to be hoped that a start will soon be made in the right direction and forestry seriously taken up by Nova Scotians.

THE CHAIRMAN.—We have had a couple of very good papers as to the forestry of Nova Scotia and New Brunswick and the subject is open for discussion now. As to the suggestion that Mr. Johnson made that all these things should be printed, it seems to me that would be prudent if we could get these papers earlier and that we should know their contents before the meeting takes place. We really hardly know anything that is in these papers from simply hearing them read when they come up for discussion. It seems to me if we expend a little money in having these papers printed before being presented to the meeting, we would be enabled to discuss these things much more intelligently. It appears to me that if we discussed the papers which were read a year ago, we would know what we are talking about. However the subject is open for discussion, and if any gentleman has anything to say on the subject we will be happy to hear him.

MR. JOHNSON.—Mr. President, in respect to what you have said that we should come here loaded, we cannot do that unless we have the report in advance. We can then come here to unload ourselves, which is what we ought to do.

In respect to Nova Scotia, I may say the area of the Crown lands there is now small, not more than 1½ million acres of Crown lands remaining. The land is in the hands of

private individuals. In the Annapolis and Cornwallis Valleys referred to by Mr. Whitman in his paper, the various stages have been:—1st narrow cuttings into the forest on the first bench along the tidal waters of the Bay of Fundy and Basin Minas and the rivers flowing into them. There the French built their houses. Then, 2nd, they set to work to reclaim from the tides the dyked lands of Grand Pré and other parts. Behind their homes on the first bench or rise of land next to the dyke lands was the dense forest, on which the settler depended for his lumber and his firewood. As settlement increased and as after the deportation of the French the New Englanders came flocking in, further demands were made on the forest till now the northern slope of the Grand Pré region and the southern slope of the Gaspereau Valley are without forest altogether. This process has gone on all over an area of some 450 square miles of what has become, under enterprise of its people, one great orchard, the land being the best in the world for the cultivation of the apple. The forest has disappeared. The orchard has taken its place. There is no hope that the forest can, in that region, be developed again. I do not see that we can do very much as a forestry association there. It would be a good thing if we could persuade the people, to keep the South Mountain and the North Mountain as a forest reserve, for two reasons, because of the great natural windbreak they form, and because as the land is denuded of its forest trees the insects whose natural habitat is among them, accommodate themselves to the changed conditions, and soon begin to attack the fruit trees. In this direction this association could do good.

In a general way to make the Forestry Association of any benefit, I think we should adopt the course I suggested, as we have so much more ground to cover elsewhere throughout the Dominion.

PROF. MACOUN—In hearing the last paper read, I thought it was just an epitome of the destruction of the forests that was going on in every province of the Dominion, and Nova Scotia has got nearly into the position now of the moon; she has nothing left. Her atmosphere is gone and all is gone. The writer of the paper showed you what it was and what it is, but here is the point that I want to emphasize, some years ago, as Patrick would say, I was 'agin' private proprietors of our lands; I do not see why all of our timber lands should get into the hands of private individuals. Now, sir, I am in favour of it. Why? Because our governments are like any other corporation; they are of no value in the preservation of the land of the country. There is not enough money in it for them. It is common sense; if I own 10,000 acres of pine land, do you think I would sit passively in Ottawa and not see that it was properly guarded. When Mr. Johnson speaks of Western Nova Scotia, I can tell him publicly what I have told him privately, that when the people take the wood off that northern mountain and let the Bay of Fundy air into the Annapolis valley, good by to their grand orchards. That is not all; the paper states that the lands that are in the valley now, and that are being preserved, are in whose hands?—the hands of private individuals, and in Ontario to-day the lands that are in the hands of private individuals are looked after carefully, and I have no doubt the lands of Ontario to-day are better looked after than those of any other province in the Dominion, so that, between the government on the one hand and private individuals on the other, our forests are being fairly well protected, but there is no province in the Dominion where adequate protection is being carried out, and I have been up and down all of them. In British Columbia they have the grandest forests on the globe, and yet they are going to destruction every year, and the only hope

for the country today, is to get the lands into the hands of private individuals and then they will look after them for their own interest, and their own interest is the interest of the country. Better have a few millionaires owning these lands, and give employment to the people, than allow them to remain in the possession of the government which will allow the lands to be destroyed and impoverished as well as losing the revenue which they should obtain from these splendid forest lands.

The CHAIRMAN—I may say there is a very great deal of truth in what Prof. Macoun says.

Mr. GEORGE Y. CHOWN, Kingston—Mr. President, it is with a great deal of trepidation that I rise to take exception to the ground taken by Prof. Macoun regarding the advisability or inadvisability of private individuals owning all our forest land. I think it might seem on the surface I might say, that it is advisable in the interest of the preservation of the forests that the land should be preserved by individuals as against the government, but after all is it not the real fact of the case that it is because we have not as an Association and those interested in forestry, poked up the government sufficiently to impress upon them that it is their interest to show that they represent the people in this matter? I have had the privilege at Kingston and other places, of sitting at the feet of Prof. Fernow, and if there is one fact that he has driven into us, it is that the individual cannot do forestry work, that the returns are too slow and the interests are too great to make it advisable for the individual to undertake reforestation as a private industry. A large company who are content to look to the future for their profits and to carry their capital in the increased increment of the wood may be able to do so, but the ordinary individual must see to it that he is getting a proper and immediate return, and he cannot afford to risk the danger from fires and winds and insects that threatens the forest. Therefore, we must, if we are going to have proper attention paid to forestry, depend on the governments, and it is our duty to see that the governments are the forces which are to protect the forests. We must see to it that, acting for the people, they must protect our forests, and by their stumpage dues and in other ways receive their return, not to-day or to-morrow, but in 25 or 30 years hence receive that profit and return that the people should receive from their forests. I think it would be an unwise thing for this Association to let it go out to the country that they are taking the stand the government should deprive themselves of the control of these forest lands, and that they are going in for individual forestry. I should prefer that the government should more and more take control of the forests, and that more and more should the persons who are put in control of these forests be guided by the ideas which we are trying to inculcate here.

Professor MACOUN.—Mr. Chown did not read between the lines in my speech.

The CHAIRMAN.—I think that after all it will be found that this gentleman and Prof. Macoun are not far apart. Prof. Macoun refers, as I understand it, to existing forests, Mr. Chown refers to forests to be grown, and the fact is that the growth of new forests must be undertaken by the government. This matter came very prominently before me when I was in London. Dr. Lyon, a member of the British parliament, was trying to get the government of Great Britain to provide for the reforestation of certain portions of Ireland. He wrote to me and asked if I would assist him, and I told him

that this work must be done by the government, for the simple reason that the country had a right to ask the government to do it, and for the further reason that the government could get the money necessary at a low rate of interest. The money must be got at an exceedingly low rate of interest if the undertaking was to be of any value as an investment. I further said to him that you could not expect to derive any revenue for about sixty years above the cost of caretaking, and when you took the difference between an individual and the government in the matter of obtaining the money necessary, the disadvantageous position of the individual will at once be apparent. He said it would take £2 per acre to plant these lands without reference to the value of the lands themselves. At about 8 per cent for interest, compounded semi-annually, it would cost the individual, this would mean an outlay of about sixty times the original sum (actually 110 times) without any immediate return. At the rate of 3 per cent it would only cost the government about five times the original outlay. I have not the figures, but at any rate the difference would be over twenty times in favour of the government. The idea of Prof. Macoun is this, there is a very valuable forest and the government are looking after other matters than protecting it as a Crown forest. The individual would take more care of it, and it would be better that the individual, even if he did make a little money out of it, should do so when he has to give employment to labour than that the forest should be burned up and destroyed. I think we are doing right and that we ought to make it the interest of the government to protect the forests and to realize that the forests constitute one of the most valuable assets they have in the country, but none of us would say that the individual should take this work away from the general public.

Mr. JOHNSON.—I do not see that there is any difference between Mr. Chown and Prof. Macoun at all. They both go in for the millionaire to take charge of it. The millionaires are very few in number; one of them is Mr. Vanderbilt. I do not know but that Mr. Vanderbilt has shown that a millionaire can do better than the government. While the millionaires are so few and the government is one of them, I have no objection.

Mr. THOMAS SOUTHWORTH, Director of Forestry for the Province of Ontario.—Mr. Chairman, I have heretofore had the idea that Prof. Macoun was loaded up to some little extent with socialistic ideas and to hear from him that the millionaires should own our timber limits struck me with some little surprise. Did it not occur to Prof. Macoun that if private owners are protecting their timber limits it must be to some extent due to the fact that they are in partnership with the government? I think it will be admitted that the initiation of protective measures adopted by private owners originated with government officials and was adopted by them in partnership with the government and it is in partnership that they hold their lands. There are no other private holdings of timber lands to any extent in this country except as joint owners.

Prof. MACOUN.—All I spoke for, Mr. President, was to get gentlemen to stop and think and it has been done. I am with the gentlemen who are in favour of the government owning forest lands, but when the government do not do their duty I am with Mr. Chown who says that they ought to be poked up a little more. When I stand here and look at the country from Mattawa to the Pacific Ocean I feel that I could burst into tears at the awful destruction, and it is going on all the time. We have to keep at them. As I said the other day at another meeting: I had been with a gentleman four

times and I said that I could not touch his conscience, and a gentleman said 'poke him once more,' and I did and got blood.

Mr. JOLY DE LOTBINIÈRE.—I am very much in sympathy with the first remarks made by Prof. Macoun, that is that the individual should take upon himself that which I take upon myself to a large extent, the protection of his lands in co-operation with the government. We will suppose the case of a large limit holder; the government has its forest rangers over the district. What I maintain is that the government fire ranging system is not sufficient and that the private owner, though he is called upon to pay the government a certain percentage per mile for forest protection each year, should still, for the sake of his limits, take upon himself a certain amount of protection. He should have a fire ranger present, he should organize some system of protection during periods when there is any danger of fire. I may mention what we do in this small way in protecting our timber in Lotbinière through which the railway passes. As you gentlemen all know in many cases it is where the railway passes that the fires occur as will be evidenced on the line of the Canadian Pacific Railway to the coast. Our property forms part of a comparatively large section of forest which stretches over an area of from thirteen to fourteen miles. Of course there is no government aid there; it is private property and we are called upon to look after our own interests absolutely. We have on the section of twelve miles of railway intersecting the forest two gangs of men during dangerous weather. Each gang is provided with one of those railway velocipedes, shovels, hose, buckets and so on, and as the trains pass one gang will patrol six miles one way, and the other gang will patrol six miles the other way. I cannot tell you the number of incipient fires that we have put out in the last six years since the Intercolonial has passed through this section. I am glad to say that our neighbours in the west have more or less adopted the same policy, and we have been mercifully protected against disastrous fires. I simply mention this fact to emphasize what I said at first that if you want efficient protection you should not rely altogether on the government. I believe that any man who is rich enough to own a thousand miles of pine limits, or 2,000 miles, is also rich enough, since he cannot insure his property, to pay what the government ask for generous fire protection, and he is also rich enough during the periods when there is danger from forest fires to organize gangs of men to patrol these lands in most places where fires may originate. We should not throw everything on the government, we should co-operate with the government and should help ourselves also, and if limit holders would but co-operate and go further than the government in protecting the forests from fire they would not have the disastrous and terrible effects they are having at the present time.

Mr. AUBREY WHITE, Assistant Commissioner of Crown Lands for Ontario.—Mr. President, I should like to make a remark or two in connection with what has fallen from Mr. Joly where he has said that the lumbermen ought to provide rangers in addition to those that the government keeps employed. I suppose he is more particularly referring to the system that prevails in the province of Quebec, where I understand, the rangers are appointed by the government and where the limit holders are assessed so much a mile for that protection. We, in Ontario, have an entirely different system. We do not tax the limit holders so much a mile for fire ranging, but we say to the limit holder: How many men do you think are necessary to protect your limit? He tells us, then we say to him: You no doubt think the best men to protect that limit are your

foremen or rangers who are familiar with the topography, and we will leave it to you to get the men. He pays half the expense and we pay half. In that way a partnership is established between them and the expense is borne between them. That system has been found to work very well with us and we have been fairly successful. I do not wish to anticipate the few remarks I will have to make this afternoon in connection with fire ranging, but merely to point out the distinction between the two systems in the two provinces. I wish to say that in the past, fires always followed railway construction. I do not think there is any necessity for that if proper care is exercised during the period of construction. Most of you know that when the Canada Atlantic Railway was constructed through a densely-timbered part of the province very little fire occurred during the construction or since. The explanation of that is very simple, however; rangers were placed there during the construction under the superintendence of the chief ranger, who is also a magistrate, to see that no fires gained headway, and so we have been successful in protecting the forests from fire. I do not think there is any difficulty at all, provided that course is pursued in places where there is railway construction going on.

Mr. JOLY DE LOTBINIÈRE—What I meant by fires following the railways was not so much fires following during the period of construction but during the subsequent operation of the railway. If those who are opening their tracks through the forests were able to cope with fires, to see that there is no danger and to see that the fire is properly put out, that is fairly safe while putting the railway through, but it is after the railway is built and there are hundreds and hundreds of miles of forest that the railway is running through and no adequate protection—that is where the danger comes in.

Mr. CAMPBELL—Perhaps I might say in connection with this discussion, that in regard to the question of the government of Nova Scotia taking an interest in the subject of forest preservation or management, I think the government are beginning to wake up to the importance of the question, but if they are to be kept fully alive to it there has to be an interest taken in it by this association and by the lumbermen and others down in Nova Scotia who are particularly interested in it. I suppose that private individuals who are holders of timber lands naturally understand the situation in regard to forest fires better than some members of governments who are not practically interested in the subject until they find themselves filling positions which require them to take an interest in it, and they need to have the information as to the needs of the case placed before them. When Mr. Whitman sent his paper up to me, I wrote to him and asked what this association could do to assist in bringing this matter to the attention of the government and to invite some action. He replied saying that he thought it would be a good thing if we could have a meeting of this association at Halifax some time during the session of the local House or during exhibition week in September. More than that, our Vice-president for Nova Scotia has induced the Crown Lands Department to send out circulars all over the province to limit-holders and others who may have knowledge of the forest lands in Nova Scotia, requesting that facts and opinions be submitted, so that this information can be gathered together and be at the disposal of the department in any steps they may take to arrange a forest policy. When the conference of provincial representatives was held in Ottawa to meet the Dominion Government, I availed myself of the opportunity of speaking to Hon. Mr. Longley, who has charge of the Crown Lands in Nova Scotia. Unfortunately I could only have a few minutes' conversation with him, but he expressed great interest in the matter and wanted

all the information he could get on the subject. He said, 'What steps can we take? On what lines can the government work? Any information coming from the association which will help us to settle what we are to do, will be welcomed.' There is where our association can do some good work if it will only take hold of the opportunity.

MR. N. MCCUAIG (Superintendent of Forest Rangers, District No. 1, Quebec)—Mr. Chairman, I hold the position of Superintendent of Forest Rangers for the Upper Ottawa river district in the Province of Quebec, while Mr. Cormier is Superintendent of Forest Rangers in the eastern part of the province. Probably he covers a territory of 30,000 miles in extent, and has under him a large number of men. As to the system we have in the Province of Quebec, I do not know whether it has been fairly represented by Mr. White, who spoke a moment ago. I do not find that there is a great deal of difference between the system in Ontario as compared with the system in Quebec and also the system that obtains over the Dominion. The mere matter of paying the men may constitute a very small difference. In Quebec our rangers are under the superintendence of the government; in Ontario they are controlled partly by the government and partly by the lumbermen. Many lumbermen tell me that they are not at all satisfied with the system in Ontario, and that our way is the proper way, while some of them think that the Ontario system is the better one. But it must not be overlooked that one of the principal uses of fire protection is to take care of the fire in its incipient stage. There is no system of fire protection that can compete with a fire after it has fairly started. There must be something to stop it. It must wear itself out by coming to an extensive sheet of water or by being checked by a change of the wind. But we cannot always place a lake in front of a fire. Then, the principal duty of the ranger is to try and do what he can to prevent the fire from getting a start. I do not know that loss by fire since I had anything to do with the superintendence compares unfavourably with that of Ontario or any province of the Dominion. I think our system works fairly well if we take a little care of it. We are trying to urge upon the government to give us a little more of it. The number of fires we have dealt with successfully the past few years is something surprising. We had a fire in the Temiskaming country, one of the worst fires we have had, and it came from the province of Ontario, where they had no protection at all. Our ranger happened to be at the Indian village at the head of Lake Temiskaming and he got out a large number of the villagers and succeeded in getting the fire put out. Another fire which we had during that same year is what we call the Hay Bay and Chippewa fire in a district where there was a considerable second growth. That fire was started by settlers. I hold that in order to deal properly and successfully with these incipient fires it is necessary to try and get the co-operation of the municipalities, because they always occur on the outskirts of the municipalities and it is necessary to try and get co-operation between the rangers of one province and the rangers of the other. We have a system of special rangers. The regular ranger has his beat cut out and he has to take special care of it. At a given time he may not be very far from a settlement and yet far enough away from it that he cannot assist at a fire that may occur on the border of the settlement. If there was provision made by which the citizens of the municipality could be called upon and be made responsible for the care of these fires I think it would be a step in the right direction. This is a difficult question, I know, to deal with, but I hope our government will act in this way and then we will have more relief from settlers' fires.

Mr. WHITE—I wish to correct a misapprehension ; that is, that I instituted a comparison between the systems in Ontario and Quebec. I instituted no comparison at all. I merely said they paid their rangers by one system and we paid ours by another.

Mr. STEWART—This discussion has taken a pretty broad range. We set out with some academic discussion as to the views of Adam Smith, and now we have got to the fire rangers. This afternoon there will be a discussion on the fire rangers and this subject will come up again. I want to say a word as to the different systems in the different provinces of the Dominion. There is no need of any discussion as to the relative merits of different systems, because what is suitable in one province may be unsuitable in another. The system of Quebec is different from that in Ontario. I had a few years ago to frame some regulations for the protection of the forests in the far West, and what would apply to Ontario and Quebec would not be suitable there. I had hoped this afternoon that Mr. James Leamy would have his paper here, because, having charge of our work in British Columbia, he would be able to give the results of his work there. In that country we have taken a different plan in this way : a great deal of the country is still under the Crown, it is not leased and we have our rangers appointed under supervisors. In the railway belt of British Columbia there are nine rangers controlled by one man, under whose supervision they act. In wet seasons they are not out at all. The supervisor has authority to call them out in dry times and to tell them to stop when their services are no longer necessary, and he certifies to their accounts. In that country we have been very successful. In the North-west Territories it is somewhat different. However, all this will come up in the afternoon, and as I find that there are some other matters to be discussed in connection with these papers, I would make the suggestion that we adjourn until two o'clock, when the papers of Mr. Hendry, Mr. White and Mr. Leamy will come up.

On motion of Mr. Stewart, the meeting adjourned at 12.30 p.m. until two o'clock.

Afternoon Session.

The meeting was called to order at 2:30 by the President.

FOREST FIRES.

Mr. Stewart read a paper on forest fires prepared by Mr. W. A. Hendry, formerly Deputy Commissioner Crown Lands, Halifax, N.S.

FOREST FIRES.

W. A. HENDRY, FORMERLY DEPUTY COMMISSIONER OF CROWN LANDS FOR NOVA SCOTIA.

Ever since I came to the province in 1839 I have heard and read of the destructive nature of 'forest fires' remarked upon. The axe, if used with ordinary judgment, is a benefit to the forest, whereas fire sweeps everything before it and is a positive destruction for the time.

It is said by intelligent lumbermen that a forest, say of spruce, will recover itself in from 16 to 18 years.

I have been travelling over and conducting surveys in every county of the province for upwards of sixty years, and can name places where to connect surveys two miles of naked burnt barrens had to be measured over. Recently the same land has been applied for as lumber land and found to be covered with a dense growth of young spruce. This fact shows the marvellously recuperative nature of Nova Scotia as a timber producing country. As an example, take the section of country from the head of Bedford Basin to the Halfway House or Pockwoch Lake, say 40 square miles would cover the area of the section referred to. Halifax has been built from that section. The houses, stores, wharfs, sidewalks, all wood, as also the fish barrels and boxes all come from that section. I ran out several lines this winter and found the land as well wooded as it was 60 years ago, except the pine, which does not grow as fast as spruce. In addition, an enormous quantity of shingles, shooks and boards has, during the last hundred years, been shipped to the West Indies. In the above section there are, as it were, three settlements: first, house builders; second, coopers; third, shingle makers, and I remember seeing through the section about ten saw-mills. The above may be taken as a fair sample of the province generally where soft wood prevails. The soil of this section is not much as profitable farming land. It is a cold, heavy clay soil, resting on Silurian rock.

Preston township, just back of Dartmouth, is mostly naked granite; one would wonder how trees could have grown upon it. When I came to the province that granite range, called the Preston Hills, was studded over with large trunks of old pine trees called rampikes; the roots were large and it was a curious and interesting study to observe how far they had to travel in search of food, but decomposed felspar of the granite gave an ample supply of lime and soda. That section of country, say from Bedford Basin extending eastwardly, has been more or less under fire every year since I have known it. Naked and desolate as this section of country is, were it left alone, *i.e.*, remove man from it, and in forty years it would be a dense forest.

The time to put a forest fire out is night—begin after 10 p.m. On three occasions I was the means of putting out forest fires, but had always to pay men who assisted out of my own pocket.

Nova Scotia is a remarkably good tree producing country from end to end and from side to side, provided fires were not made. All the forest fires I have known have been the result of 'cussedness' or carelessness. Had the country been left alone the most barren portions would be covered with trees.

For the sake of calling your attention to what I consider a reliable record is the excuse I offer for copying a short paragraph from a long article by the late Titus Smith on the subject of forest culture and protection.

'This province was originally covered with soft wood, chiefly red and black spruce mixed with balsam firs. The most barren portion always had a mixture of white pine and the best of the soft wood ground was chiefly occupied by hemlock, which generally had a sprinkling of tall spruce, fit for mast timber, and a few large yellow birches. Previous to 1783 the few Indians in the country had the forest all divided among their families, their limits being sometimes traced on rude maps drawn on the bark of the paper birch. No Indian was permitted to set a trap on the land of another, nor to start a moose from the yard where he had stationed himself for the winter. Viewing the wild animals as their property, they were very cautious never to set fire to the woods, as in a dry season in summer the leaves of the spruce and firs are remarkably combustible and fires spread very rapidly, making havoc among the moose and rabbits (which are a small kind of hares who never burrow in the ground).

'In 1783 a great number of refugees and discharged soldiers came into the province and new settlements were formed round the shores. The following year there was no rain in June, the last week in May and the first ten days of July. The barren lands covered with thickets of spruce were set on fire and within a fortnight, it is believed, more than half the province was burnt over. A single fire kindled by an old soldier had in five days run more than fifty miles. The green leaves of the spruce and fir produce a most extraordinary quantity of both smoke and flame, and with a high wind the fire will often run a mile in ten minutes. The moss and litter was burnt off the ground and all the leaves of the trees consumed. These fires did not pass over the hardwood land, and in most cases the hemlock groves escaped, as this tree does not form a cone covered with branches, but generally forms a stem from 18 to 30 inches in diameter, which rises from 30 to 50 feet to the lowest branches of its round head. The edges, however, of the hemlock and hardwood land were killed for a distance of 30 to 50 yards by the flame of the adjoining spruce. The large swamps also escaped and served for seed beds to introduce wood again into the burnt land.'

It may not be out of place here to remark that the late Titus Smith in his lifetime knew more of the natural history of the province than any other man then living. See his reports of his journeys over the province in 1800, '01, '02, made under special commission from Sir John Wentworth, then governor of the province; also his evidence before the 'Durham' Commission in 1839, in which he gives the natural history and condition of each county in the province, also lectures on botany and many articles in the old *Acadian Recorder* on forest culture and protection.

In the annual reports of the Department of Agriculture of the United States there are many able, earnest articles on the subject of forest protection and its importance to national health, wealth and prosperity. In this province of Nova Scotia you have only to leave the land alone and it grows up with trees. To protect the forest follow the example of that simple, harmless people, the old Acadian French, and the aboriginal people of the country, *be careful about fires.*

HISTORY AND RESULTS OF THE FIRE RANGING SYSTEM IN ONTARIO.

Mr. AUBREY WHITE, Deputy Commissioner Crown Lands, Toronto, being called upon by the Chairman, spoke as follows: Mr. Chairman, I think there is some misapprehension that I would read a paper at this meeting of the Forestry Association. Some time ago I had a communication from the Secretary and I thought at that time that I might be able to read a paper, but I found my time was so fully occupied that I could not prepare anything that would be worthy of the occasion of the annual meeting of this association, in fact I said I was afraid I would not be able to be here, but I found I could be here and in speaking with Mr. Southworth, I said that I would come

here and take part in the discussions, not intending to prepare a paper or anything of that nature. But I find that I am down on the notice paper of this meeting, to read a paper on Fire Ranging. I cannot do that because I have not prepared any paper, but I have made some notes and I have the subject matter fairly well in my head so that I shall be able to tell you the origin, so far as Ontario is concerned, of the fire ranging system, what progress we have made and the results that we have attained. You will all know that the subject of protecting forests from destruction by fire is one which has been interesting the Governments of this country and individuals who are financially interested for a considerable length of time. Large quantities of pine timber and other timbers have been destroyed from time to time by fires, and great losses have been entailed, not only upon the province, but upon the individual limit holders. The province is interested very largely, because it is the owner of the stumpage upon the lands of the Crown, and it also has an interest in the licensed lands to the extent of the Crown dues upon the timber, as it is cut, which amounts to from $1 to $1.25 per thousand feet. In addition to the interests of the Government and of the licensees there are several other interests. I am not going to touch upon all of them, but there is the interest of those people who love to see nature in its original state. Speaking for myself, I am one of those people. In my early days in this country, I almost lived in the forest, trading with the Indians, and I can recollect seeing hundreds upon hundreds of beautiful little lakes almost like diamonds, set in the emerald green of the forest, as I moved about from place to place. Year after year afterwards, when I visited some lakes, I found nothing but blackness and desolation. That to me, was a matter of great regret, as it must be to anybody who loves the forest, and who loves to see it in its natural green state. Any person who has been accustomed to canoeing, and who, after going through a long hot portage, puts his canoe into the water, gets into it and is able to sit there and look on the beautiful lake and at the green carpet extending from the shore to the highest point, knows what a beautiful and consoling sight it is to anybody who has an eye for the beautiful. But, I must not speak as to the beautiful, I am here to speak as to the financial part, that is the loss of the timber. We thought in the province of Ontario, that something ought to be done to put an end to the tremendous injury being incurred and the first step that was taken in that direction was the passage of an Act known as the 'Act to provide for the preservation of the Forests from destruction by fire.' That was passed in the year 1878 when Mr. Pardee was Commissioner of Crown Lands. The Act itself shows a knowledge upon the part of the person who framed it, of the people who mainly cause forest fires, how these fires are caused and it provided pains and penalties for those who do not observe the law. The law was to be enforced by Crown Land Agents, Crown Timber Agents and Forest Rangers. Well, I need scarcely say to you, gentlemen, who are acquainted with the subject, that the duties of the Crown Lands Agents, comparatively speaking, did not take them into the bush, and that therefore, so far as they were concerned, they were not calculated to put the law in force, for they did not succeed in finding the people who broke it. The same may be said of the Crown Timber Agents and as there were very few of them at that time, they did not get about very much. Then, we really had no other officers, except a few forest rangers who could not begin to look after the settlers and others when setting fires. The consequence was, as usually occurs, where everybody was left to see that the Act was enforced, the Act was not enforced and it became, to a great extent, a dead letter. Matters remained in that condition until the year 1885. I had come into the Crown Lands Department in 1882 and Mr. Pardee, knowing that I had had some experience as a

THE WHITE PINE *(Pinus Strobus).* [p32.]

lumberman and as a ranger, or Crown Timber Agent, thought that I ought to be able to advise him as to some system or scheme which would be beneficial, and he asked me to prepare a memorandum. I prepared a memorandum for him in the year 1885. That memorandum embodied a scheme for a system of forest rangers. I pointed out to him that the dangerous period of the year, so far as forest fires were concerned, would be between May 1 and October 1. I understand that in the Ottawa district sometimes the month of April is dangerous, but generally speaking the dangerous period is from May 1 to October 1, and I suggested that a number of men should be placed upon the licensed lands during that period, and that, as to the number of men which would be requisite for that purpose, we in the Crown Lands Department were not in a position to say. You will easily understand that a great deal depends upon the topography of a limit and how it is cut up by lakes and streams, and also how the timber is situated, as to the number of men it will be necessary to have in making proper provision to take care of it. I said to the commissioner that the people who will understand all about that will be the licensees, because they know the timber limits; their foremen and rangers are thoroughly acquainted with them and can advise them and they will be the people best calculated to tell us how many men are necessary for each limit. So we decided to leave it for the lumbermen to state the number of men they would require for each of their limits, each lumberman speaking for himself. And, having determined upon leaving the number of men to the licensees, the next question was who should appoint the men, who should select the men. Well, it appeared to me, and I am glad to say it appeared also to the Commissioner of Crown Lands that we ought as far as possible to eliminate everything of a political nature, that it should not have even the smell of politics, because, whether it is right or not, any service of this nature that is carried on under Government superintendence and paid entirely by the Government is sometimes criticised and attacked, whether rightly or wrongly I am not going to say, but the fact remains that there is always a suspicion that it is being used for political patronage. Mr. Pardee was anxious to eliminate that idea from the service. He wanted to get the confidence of the public, and, above all, the confidence of the lumber trade, in order to make this system a success. Then we concluded to leave the selection of the men to the individual limit holders also, because we felt satisfied that they had in their employment men who knew their limits just as well as I know the Crown Lands Department, who would know where the dangerous points were, who would know the character of the settlers, who would know where the hunters were in the habit of passing, and generally where travel was passing through their limits, and they would be able to select the best men to put them on duty, and not only to put the men on duty, but to see to some extent that they performed their duties. Therefore, it was finally left to the lumbermen not only to say how many men they wanted, but to say who the men should be, and in that way, I think, we invited the confidence and respect of the trade. Now, sir, having got the men selected by the lumbermen, the next point was the instructions that should be given to them. It was quite unnecessary and it would have been very foolish of me to undertake to instruct men who knew the bush, who were accustomed to it, who knew the characteristics of the people that were going into that part, how they should proceed in a particular instance. We must leave to those on the spot, knowing all the circumstances of the men they had to deal with, to determine what steps were necessary in the premises. But, we did ask that they should select men who were cool in temper and of good judgment, and that they should impress upon them the necessity for not attempting to harass or unnecessarily

annoy settlers, because, I need not say to you, gentlemen, who are experienced in this matter, that if you antagonize the settlers, if you create on their part an antagonism and a desire to get even with you, why ten thousand men would not protect the forest lands of this province from destruction by fire, because it is the simplest thing in the world to throw a match or a little bit of fire here and there, and so it was that we were desirous that these men should be cool and temperate in character, and should, instead of being arrogant with the settler, endeavour to enlist his sympathy and impress upon him that his interests were as much to be conserved as the interests of the Crown and of the lumbermen, because no settler likes to see his farm burn or his belongings destroyed, as sometimes happened. Now, the Act for the prevention of forest fires was a dead letter, but having created this staff to try and put an end to the destruction of the forests by fire, the first thing that became necessary was to revive this Act, to let the people know that there was such an Act in existence and what its conditions were, so that everybody should know what was expected of him, and that in certain cases he would be guilty of an infraction of the law. Therefore, we had the Forest Fires Act printed on large sheets of cotton and in pamphlet form, and we sent hundreds of these posters and pamphlets to the rangers with instructions that they were to post up the large posters at every portage, on the rivers, on every road where people cross them, and in all conspicuous places where people would have an opportunity of seeing them. In addition to that they were instructed to distribute the pamphlet copies, to hand one to every person with whom they came into contact, and, if necessary, to explain the provisions of the Act, to point out its penalties and to make the people thoroughly and particularly acquainted with it. I am glad to say that the Act is now an open book in the rear of this province. Everybody knows the Fire Act and its provisions, and what it means, and the consequence is that now there is nobody who can say: 'I did not know that the Act was so and so.'

Then we instructed these rangers also to move about through the limit so as to become acquainted with its topography, to become acquainted with the dangerous points, to know where large bodies of timber were and to have a good general knowledge of the limits. In connection with this I thought that it would be a most valuable thing for the lumberman, while his limits were being guarded from fire, that he should be able to avail himself of the services of a fire ranger at the same time to procure information as to where the timber was situated, what streams were convenient to it and all information which would enable him to handle his limit in an economical manner. It seemed to me to be right to combine the two duties as far as possible.

Then, we also instructed them in case of fire springing up as to what they were to do. We gave them *carte blanche* to call in all the assistance they might think necessary for the purpose of extinguishing the fire and after a fire was extinguished they were under instructions to report to the limit holder the cause of the fire, how much timber was damaged and where the timber was situated, and to make a similar report to us, the object being that the licensee could know where the damaged timber was so that he might make preparations to cut it during the ensuing winter, and we had the same information.

Then, the question came up as to clothing the rangers with authority. Of course, they would not be of any use if they had not some Government authority, and so, in order to bring them under the provisions of the Fire Act, we appointed them bush and

fire rangers. Section 14 of the Act constitutes bush rangers *ex-officio* officers to look after the enforcement of the Act, so that we appointed all these rangers—bush and fire rangers and so made them officers to enforce the Act. Later on we found that rangers sometimes complained that they were a long way from any magisterial authority and that when they did find anybody setting a fire and caught him red-handed in the act they had to take him 50 or 100 miles before they could get him before a magistrate. That seemed to be a fault in the Act and we amended it so as to provide that by Order in Council the Government can appoint bush rangers magistrates, and an officer is able to appoint his assistant a constable under his command to assist him in arresting and bringing to justice people when they break the Act. The constable can arrest a man and bring him before the fire ranger immediately, the fire ranger can fine him, or pass judgment and then ship him off if he does not pay the fine. That would have a good effect if it were generally applied, but you must be careful as to the character of the man to whom you entrust magisterial powers and the consequence is that we have not felt able from the class of men we have had as rangers to appoint them as magistrates in many instances, but if the lumbermen will give us a better class of men and recommend them in any cases to be appointed as magistrates, I have no doubt we will be able to get the Lieutenant-Governor in Council to appoint them. Then, of course, we gave them badges and all that sort of thing so as to constitute them regular officers of the department. In another way we felt, in connection with our appointing them, that it would have a beneficial effect upon settlers and others that they met for the reason that the mere fact that they were Government officers under Government instructions would impress the people with whom they came in contact.

Now, having provided for the constitution of the service the next thing was as to who should pay for it. The lumberman has, of course, a very much larger interest in the timber—that is on the licensed lands—than has the Crown. The lumberman has the stumpage value, the Crown only collects its dues; nevertheless, at the same time, the Commissioner of Crown Lands at that time thought it would be a fair thing to divide the cost between the lumberman and the Government, that each should bear half, not only of the wages of the men but of the cost of enforcing the Act for the suppression of forest fires. So it was arranged, and this has been the system ever since, that each should pay half. For a long time this system was just one of practice. We, from year to year, appointed the rangers and we asked the legislature to give us a vote to pay them, but there was nothing in the regulations of the Crown Lands Department, there was nothing in the law, there were no regulations that created or constituted the service in any way, because, as you understand, for a number of years it was an experiment. Four or five years ago I suggested that it might be put on a statutory basis, and what was formerly the practice of the department is now the law of the province. We have power to appoint and pay and all the necessary powers to enable us to handle this service. We also provided that licensees should instruct their rangers to keep a diary in which they would enter their movements from day to day and anything of interest occurring on the limits, and that they should return these diaries at the end of the season to the licensee and that he should return them to the department so that he and the department might have full information. We expected the licensees to get from their men such information as would enable them to see where the system was defective and make suggestions as to how it should be amended. Each year, ever since the year 1885, we have sent out circulars to the licensees asking them to be good enough to tell us the

number of fires that have occurred on the limits, the amount of damage that has been done and what the monetary loss has been, and we have invited them to make any suggestions that they might have for the improvement of the service and each year we have had replies from nearly all of the lumbermen and we are yet to receive from any lumberman an objection to the system as it now prevails. The lumbermen all say that the system is a good one, that they do not know how it could be amended and that it is covering the ground it is intended to cover in the most admirable manner.

Just as a matter of interest I may trace to you the growth of the system. In the year 1885, which was the first season that the system was in operation, we had 37 men in the field at a cost of $7,911, half of which was afterwards refunded by the licensees. That year the reports from the licensees stated that a number of small fires had been extinguished, that the general effect of the rangers being in the field was good and that an interest had been created on the part of settlers.

In 1886 the number of rangers employed was 45 and the cost $9,847, half of which was borne by the licensees. The reports that year said that the presence of rangers had a good moral effect, that no trouble or friction had been experienced with the settlers, that a number of men had been employed to suppress forest fires and that the Crown Timber Agents were also active in looking after the people who were upon the limits. In that year we extended the fire district. What is called the fire district was proclaimed under authority of the Act and it only extended to Lake Nipissing, but in 1886 we proclaimed a second fire district which carried us through to the western boundary of the province. In 1887 there were 55 rangers employed at a cost of $15,000, half of which was borne by the licensees. The late Mr. Wm. Mack, of Ottawa, said to me at that time that it was the dryest year he had seen in 42 years. He said that he had received great benefit on his limits from the presence of the fire rangers. The reports show that the staff was prompt and energetic and that active attempts had been made for the first time to suppress bush fires, that the rangers had fought day and night with fire and called out assistance, as many as 100 men in addition to the regular staff of rangers being employed in extinguishing fires, that the settlers were found to co-operate fairly well with the rangers, and that the licensees were supplied with information as to damaged timber and its situation and thus were enabled to take out the timber. The licensees requested in that year that all limit holders should be obliged to put rangers on their limits, because, up to that time, the system was not obligatory. It was only those licensees that made application for rangers to be placed on their limits that had these rangers so placed, but, now, the licensees said, very properly, that it sometimes happened that the limit adjoining theirs had no rangers upon it, fire sprang up there and there was nobody to look after it. Therefore, they really received no benefit from their own rangers because the fire actually was uncontrollable because not dealt with in its incipient stage and they therefore asked that all limit holders should be obliged to put rangers on their limits. Since then we have provided for that in the law, and now everybody has to put rangers on his limits, unless we put them on, for which the limit holder bears half of the expense.

In 1887 the principal causes of fire were reported to be settlers clearing land and setting out fires in dry time and high winds, river drivers making fires for cooking, smudges, &c., and not extinguishing them before leaving, sparks from locomotives, hunters, fishermen and explorers using fire carelessly and not extinguishing it when they

were done with it. In 1887 we tried the experiment for the first time of putting fire rangers on the lands of the Crown. Before that, while we had obliged the licensees to keep rangers on their limits, we had not put rangers on the lands of the Crown, but in 1887 we did put them on the lands of the Crown and their reports showed us the wisdom of that course, because we found they had extinguished a number of fires close to large bodies of pine timber which would inevitably have been destroyed had these rangers not extinguished the fires. In that year there were 110 fires reported and the quantity of timber reported damaged was 200,000,000 feet, but owing to the fact that they were able to take it out in time the net loss of money was estimated to be about $70,000.

In 1888 the number of men was 70 and the total cost of the service $17,854. In that year there was a heavy fire on the Petewawa and also a number of other fires amounting altogether to 70 in various parts of the territory. The quantity of timber reported as having been damaged was 160,000,000 feet, 15,000,000 feet of which it was said would be a total loss. The cause of fire was stated to be carelessness of settlers in clearing land.

In 1889 there were 75 rangers employed at a total cost of $15,468. In that year there were reported only a few fires and it was said that all damaged timber would be cut and that the service was very satisfactory. Now, something was said this morning by my friend Mr. McCuaig about his experience in dealing with the Government in endeavouring to suppress and prevent forest fires. We have legislation in respect of that in our province. I do not know whether they have the same legislation in the province of Quebec or not, but I wish to call your attention to it here. There is an Act which authorizes the appointment of fire guardians and for the better prevention of bush fires. It was passed in 1889 and it provides that the council of a township may on the petition of one-third of its ratepayers at its first meeting in any year appoint by by-law not less than two resident freeholders for each polling subdivision to carry out the provisions of the Act, the persons appointed to be known as fire guardians and to hold office until the appointment of their successors. It provides that after the passing of this Act no person shall 'set out or set fire to any brush heap or other combustible material in any field, clearance or place in such township where the same would be likely to spread, between the 1st day of July and the 1st day of October in any year without first having obtained leave in writing from one of the fire guardians.' The Act provides further:

'The obtaining of such leave or permission in writing of the proper fire guardian shall not be pleaded or given in evidence in any action for negligently setting fire, or in extenuation of, or in mitigation of damages; but the absence of such leave or permission shall, in such an action, be deemed *prima facie* evidence of negligence.'

Then it says further:

'It shall be the duty of the fire guardian appointed as aforesaid, on being requested to grant leave and permission to set out fire, to examine the place at which it is intended to set out the fire and the adjoining lands, and the timber trees and other property thereon, and to refuse such request, and decline to grant leave and permission if, in his opinion, it would not be safe by reason of the danger of fire spreading therefrom or otherwise.'

The council of any township municipality is empowered to make provision for the payment to the fire guardian for his services and to fix the penalty to be imposed upon fire guardians and others refusing to perform or neglecting their duties under the law, and further, that any person setting out a fire without permission is to be subject to a penalty of $100. There is a very drastic Act if it is enforced by the municipalities, but —of course, I speak without accurate knowledge—I do not think that very many of the municipalities have passed the necessary by-law required by this Act. Subsequently there was another Act passed strengthening this and providing that all people who were liable to perform statute labour should turn out upon notice by the fire guardians and in the event of there not being a sufficient number of people in the neighbourhood to perform statute labour, they were to be in a position to employ men to do the work. There is a provision to enable the townships to assist the Government in keeping down forest fires.

In 1890 the number of rangers was 83 and the total cost $17,525. No fires were reported in that year and there was no loss of timber.

In 1891 the number of rangers was 98 and the total cost $20,053. The report said dry summer; numerous fires both on the Crown and licensed lands; 100,000 feet damaged on licensed lands; rangers located damaged timber and arranged for its cutting; estimated loss would be about $60,000; in addition to that quantity upon licensed lands, there was damage upon the lands of the Crown to the amount of some 95,000,000 feet. Our rangers reported where this damaged timber was, we had it estimated, sold it, and the loss was reduced to a minimum. In the old days when we had no forest rangers on the Crown lands enormous fires occurred. Anybody who has travelled in the back regions knows that, and there being nobody to report them or say anything about them, the timber went to waste and the province lost a large sum. Under the present system we are able to estimate it promptly, and in this instance it was estimated promptly and sold and the loss was reduced.

In 1892 there were 86 men employed and the total cost was $18,362. This was reported to be a very wet season and there were no forest fires. In 1893 there were 106 men and the total cost was $19,831. Seven fires were reported but no serious loss of timber. In 1894 the number of rangers was 108 and the cost $26,276. There were no fires in the eastern part of the province, but in the west, where there were no fire rangers and where extensive explorations for minerals were going on, there were several serious fires. There was a considerable quantity of pine damaged in the Rainy River district, but at that time, as the market was in a very bad state, no effort was made to take it out.

In 1895 the number of men employed was 117 and the total cost was $26,253. This was reported to be a very dry season and there were some 46,500,000 feet of pine damaged. Some pine timber in the township of Grant that belonged to the Crown was also damaged. We estimated it, put it up for sale, and got the value. The reports that year as to the causes of that fire, said settlers, hunters and camping parties, setting out fires. At the end of 1895, a new departure was made in respect to the payment of the rangers. Up to this time we paid the rangers and then rendered account to the licensees for half the amount and got it back. It was rather a cumbersome system and a

proposition was made that the licensees should pay the rangers their proportion and that we should pay our proportion.

In the year 1896, the first year under this system, the total number of rangers was 160 and the expense $47,719. That year, you see, the service went up both as to cost and also as to the number of men. A few serious fires were reported, but none of them attained large proportions. On the Crown lands three fires were reported near Wahnapitae and Biscotasing. Sixty-one million feet of damaged timber were cut and taken out. We issued a Royal Commission to inquire into the origion of the Biscotasing fire and although they went up on the ground and took evidence and made an effort to find out the cause of the fire they were unable to bring it home to anybody. The suggestion that was made that year by the licensees was that we should increase the number of rangers on the Crown domain as there was danger from the gold explorers. That year we posted notices around the blocks of pine timber forbidding explorers and surveyors to go into them.

In 1897 the number of rangers was 179 and the total cost $24,963, which was all borne by the department. You will remember that from 1896 down, in order to get at the full expenditure each year, you will have to double the figures I have given you, because the figures I am giving you now are only the department's proportion, while the licensees paid another amount. In 1897, which was reported to be a wet season, no serious fires or loss of timber occurred. The rangers reported that there was greater care exercised by settlers and explorers and altogether a better feeling was displayed. In this year we issued a commission to report on the better preservation of the forests of Ontario. It is impossible, owing to lack of time, to give a full summary of the valuable report of this commission but it recommended, among other things, that lands which were found not well suited for farming and situated at the heads of the principal streams should be added to or made permanent Crown forest reserves, that all licensed and non-licensed lands of the Crown where tourists, lumbermen, or prospectors are moving about should be patrolled by fire rangers and these rangers should be controlled directly by the Government, that fire notices in English, French and Indian should be posted along the canoe routes and along the height of land.

In 1898, the number of rangers was 195 and the total cost $26,749. Very few fires were reported in that year, and none of them important. In addition to the 195 rangers there were 11 on the lands of the Crown. In the Temiskaming and Rainy River country rangers reported that they were constantly coming in contact with explorers and hunters and warning them to be careful in the use of fire. We had no fires on the Crown lands and no amendments to the Act suggested. In 1899, there were 190 fire rangers and the total cost was $23,075. In addition to the 190 rangers there were 12 rangers on the Crown lands. There were no fires in the licensed territory, but in the townships of Bowell, Foy and Harty some damage was done and we sold the damaged timber by public auction. The recommendations that year were that we should extend the service of the rangers on the lands of the Crown. In 1900 the number of men was 185 and the total cost $26,985. There were 12 rangers on the Crown lands. There was a bad fire that year in the township of Dana, and had it not been for the presence of the rangers it would certainly have spread and done incalculable damage as the pine is dense in that neighbourhood. The timber was sold at a good

price. That year there were 90 fires reported to have been extinguished by the fire-ranging staff. The suggestions were that we should increase the staff and make the penalties more severe, that the forest rangers should be kept on duty all summer, and that inspectors should be appointed to see that the fire rangers perform their duty.

In 1901, the number of men employed was 236 and the total cost $30,066. There were ten men on the lands of the Crown. In the Rainy River and Thunder Bay districts, the rainfall was fairly heavy, but in the east the summer was exceedingly dry. On licensed lands very few fires occurred and the amount of timber damaged was small. The most serious fire was one in the Peterboro district where 30,000 feet of timber were damaged and the timber improvements destroyed. In this year a very serious fire occurred early in July in the Temiskaming district which was said to have been caused by smouldering brush heaps left by settlers. There being no pine in the region where the fire occurred no damage to pine timber was done but a large quantity of spruce and soft woods was destroyed and the houses, buildings, and effects of the settlers were destroyed and great hardship was entailed upon the new settlers, so much so that the Government were obliged to send up an officer to relieve the distress and appropriated money for that purpose. We also sent up a quantity of grass seed to be sown in the burnt territory. We also learned that year that fires had occurred in the country north of the height of land and that a quantity of spruce timber had been very badly damaged, but we were not able to get full particulars. We saw the necessity then for putting some rangers across the height of land, and last year we had two or three rangers on the Missinabie river and through that country keeping watch on those people who were travelling there so as to caution and warn them to be careful in the use of fire. These men posted up notices and distributed them to everybody they came in contact with. In addition we corresponded with the Hudson's Bay Company and enlisted their sympathy and we sent them copies of the Fire Act so that they might distribute them.

In the last year, 1902, the number of rangers was 234 and the cost of the service, that is the Government's part of it, was $34,200. Forty fires were reported and 10,000,000 feet of pine was damaged. The net loss is estimated to be not less than $10,000.

Now, I have told you about how we created the system, why we created it, its nature and how it has worked out, and I have now detailed the reports we have had from year to year showing the number of rangers and the expenditure. I do not know that I need say anything more to you except that I think the service has served the purpose for which it was established. We quite recognize that once a fire gets started in a forest and assumes any proportions it is almost impossible to extinguish it, and if you had an army of men after a forest fire gets under way you could not put it out, and our great object was to educate the settlers, explorers and others who were setting fire in the bush as to the necessity for using care and being very cautious in the disposition of the fire after they had done with it, not, as is sometimes done, kick it over and leave it to smoulder or light up as the case might be. It was one of our desires to impress caution on those people, and to get settlers, explorers, hunters and others to recognize that they had a duty to perform and that it was they should exercise great care and caution. I think we perhaps have not been able to do that to the full extent, but, I think, we have succeeded very largely in enlisting the sympathy of these people and getting them to see the necessity of being careful in the use of fire. The services

of the rangers, I think, have been beneficial to the licensees in giving them knowledge of their limits and generally putting them in possession of everything they may desire to know. I am glad to be able to say that in no case have we had a single complaint from a licensee as to the management of our fire-ranging system. We put ourselves in the hands of these gentlemen when we said to them: You name the men, you pay half the expense and we will pay half the expense. You must supervise them as well as we do; if you see anything wrong, anything you think ought to be amended or strengthened, let us know and we will endeavour to amend or strengthen the regulations or the legislation.

Mr. J. R. BOOTH, Ottawa—Mr. Chairman, I am sure I am very much pleased to hear Mr. Aubrey White's exhaustive explanation of the working of the Act which was passed some years ago for the better protection of timber, and I am sure that the lumbermen, as far as I know, have nothing but the greatest of praise to give to the Government, and especially to Mr. White, for the working of the department which is under his supervision. We have always found that the Government have been ready and willing to do their part manfully and to give the lumbermen all the assistance necessary when they required it. The Government have wisely left the selection of these wood rangers to the lumbermen. These wood rangers are appointed without any restrictions from the Government, or without any recommendation from the Government, and they are appointed by the lumbermen from the best men they have, the most careful and the most trusted men. I feel sure that the working of the Act and the assistance that the Government has given us have saved millions of dollars' worth of timber in this country.

Of course, there are some fires still and there will be. It is impossible at some times to account for them and when they get started it is almost impossible to stop them but the only thing we can do is to surround them and take advantage of the weather and fight them as the wind goes down, when the rain comes to beat them out, to be there and to leave no stumps smouldering to start up again when the weather gets dry. If there is anything that the lumbermen can do in the way of preventing fires I am sure it is one of their most anxious desires. It is a question to us in dry times what we can do. We dread every time that we hear of a storm or see smoke; we are afraid that some large pine forest is being destroyed and we immediately send out our men to examine these places, to surround and watch them and to keep our force ready whenever occasion requires. In this way I may state that a great deal of timber has been saved to the country. The Government has to enforce the regulations already enacted in every possible way without any favours and I would recommend that settlers should not be allowed to go in and settle in the part of the country which is not actually fit for settlement, which might afford a livelihood for one or two settlers but which is not fit for large settlements. I do not think that settlers should be allowed to go into a country where there is only land enough for one or two farms. It is no advantage to them, they gain nothing by it, they may make out a miserable existence for a few years but after that they will have learned that they have settled in the wrong place and they will be obliged to move out to some other place. This is one of the things that the Government should consider very carefully. We do find, I am sorry to say, once in a while, occasions where we think that there is a little slackness, not with the Government, but with the officers they appoint, and with that exception I do not know that

there is anything I can recommend to facilitate the working of the regulations for the protection of forests. I am very pleased to hear Mr. White's exhaustive explanation of the working of the Act, and I am sure that the Government must feel that the amount of timber that has been saved has recompensed them many times over for the cost that has been incurred. I hope with our assistance that the good work may continue of protecting one of the greatest assets we have in this country.

Mr. HIRAM ROBINSON—I would like to confirm what Mr. Booth has already said. There can be no doubt at all in the mind of any one who knows anything about the country that an immense amount of money has been saved by the Fire Act as it has been enforced by the Government, and I think the very fact that we have the Deputy Minister of Crown Lands here amongst us to-day is proof of the interest that is being taken in this very important matter of the preservation of the forests. In this I speak not alone of the interest of the lumbermen; I think that the work goes far beyond the interests of the lumbermen. The lumbermen's interests are only the interests of the whole country, of the farmers, manufacturers and commercial men of Canada. The protection of our pine and spruce timber should be with us a great object now, and it goes still farther than that. The protection of the whole of our forests, whether the forests are under license to lumbermen or not, should be a consideration of first importance. The magnificent forests that we have in this country should be protected. It is lamentable to one interested in the preservation of our forest wealth, when travelling by rail, or water, or carriage, to observe the terrible destruction that has gone on. Our beautiful forests have disappeared to a large extent, and this is not due to the axe. The axe takes, certainly, a large amount of timber but the destruction is wrought by fire running over the whole country, not through the lumbermen, but through the settlers, pot hunters and others who are careless about fires. I think the Governments are beginning to realize that forest protection is a work which commends itself to the people and I think all will agree with me in saying that they cannot do too much nor can the people in general do too much in supporting Governments in all measures calculated to protect our great forests. After a fire passes over you know how long it takes to re-establish the forests; certainly, it cannot be accomplished in the lifetime of a great many of us who are here to-day. I am sure that not within the lifetime of our president, or myself, can this take place, but the young people amongst us are growing up and they will have a great interest in what we do to further the protection of the forests. I say therefore that we should put forth our best efforts in that direction We are deeply interested in the report which has been presented by the Deputy Commissioner of Crown Lands for Ontario. I endorse what Mr. Booth has said, but I would like to emphasize with all the power I have not only the importance of planting and growing trees but the necessity of protecting what we have, thereby establishing a source of revenue and of wealth for our country in the future. There is nothing more important than the forests of our country. Next to these are our fisheries and the like. It has been said that the great North-west has been depleted of that noble animal the buffalo. The buffalo have gone. It is true they have gone off the face of America but to-day we have something to take their place; we have settlers coming upon the plains where these buffalo ran wild and we are getting the returns, but let the forests be swept off and what have we left? It is an important question and I am very glad to be present at this meeting to consider it. I hope greater interest will be taken in this Association than has yet been manifested by the people at large. We have an able secretary and

president and other officers who are doing so much for this Association in bringing the matter of forestry and fires in the forests before the people. It is true that the Government have helped this Association in many ways in distributing literature for it and giving it assistance which of course is what is right, and we have to thank them for the great interest they have taken. I myself feel grateful for what is being done by this Association.

Mr. STEWART—Mr. Chairman, I do not wish to speak on this subject as I am here to listen, but I cannot help saying a word on one subject that I think the Governments of the Provinces and of the Dominion should take up that has not been taken up sufficiently before, and it is, the exploration of the country with a view of ascertaining what lands should be open for settlement and what should be kept in forest and for the production of timber. I think this is one of the most important subjects that could engage the attention of the provinces and of the Dominion as well, for the Dominion has a large extent of country which is wooded. There is a gentleman here and with your permission, Mr. President, I would like to hear him say a few words. We have this morning had the announcement that a distinguished Canadian would lecture to us tonight, who occupies a very important position in one of the greatest universities in America, namely, Harvard. We have also with us a Canadian who is a forester of the Forest, Fish and Game Commission of the State of New York, Mr. Knechtel, and I would like very much and I am sure you would all be glad to hear Mr. Knechtel if he would be good enough to say a few words.

Mr. ABRAHAM KNECHTEL, Forester to the Forest, Fish and Game Commission of the State of New York.—Mr. President, it gives me great pleasure to attend this meeting of the Canadian Forestry Association. Although my name would imply that I am a German, I am in fact a Canadian. I was born in Huron County, my mother is still living there, my father went into that county and settled at Brussels at a time when the whole country was a forest. It was there that I received my first instruction in forestry as I had to help my father clear his land and a great task it was. I remember how people used to look upon the forest as their enemy. It was hard to clear and the black walnut was especially hard to burn. Now, I have been very much interested in the two papers I have heard since dinner on forest fires and I am very glad to hear the patrol system of Canada so ably and so fully discussed. In New York State we have not a patrol system. We have there a chief fire warden, appointed by the Commission, who has his office at Albany, and we have in each town where the State has forest lands a fire warden. This town fire warden establishes districts and appoints district fire wardens. When a fire occurs it is the town fire warden's business, or the district fire warden's business, to get out and fight the fire and to warn out his neighbours. The town fire warden, I believe, receives pay for the time he is at work at the rate of $2.50 a day and the district fire warden has the same pay. Now, the town pays half this money and the State half, and the chief fire warden—in fact all the fire wardens—post fire notices and educate the people as well as they can as to how to prevent fires. One point has struck me forcibly in the discussion of these papers. There seems to be a difference of opinion between the authorities of New York State and those of the Dominion of Canada in regard to the time when the settlers should be allowed to burn their fallows. I believe that Mr. White stated that fires must not be set between the 1st of July and the 1st of October.

Mr. WHITE—That is in municipalities where the particular Act to which I refer is in force. There is no prohibition in the general law. They require to use extra care between the 1st of May and the 1st of November, but the special Act which applies to municipalities says between the 1st of July and the 1st of November. In the general Act it is between the 1st of May and the 1st of November.

Mr. KNECHTEL—That is the time I understand that fires shall not be set out ?

Mr. WHITE—No, no, but they must get a permit from the proper officer.

Mr. KNECHTEL—Then fires may be set ?

Mr. WHITE—Fire wardens are appointed in each township, and people desiring to set fires must notify these fire wardens and get permission to set fire and clear their fallows.

Mr. KNECHTEL—I read from the New York State law as follows :—

'Fires to Clear Land.—Fallows, stumps, logs or fallen timber shall not be burned in the territory hereinafter described, from April first to June tenth, both inclusive, or from September first to November tenth, both inclusive. From June eleventh to August thirty-first, both inclusive, such fires may be set therein if written permission of the fire warden or district fire warden of the town or district in which the fire is set has been first obtained.'

So that in that respect it would seem that the law differs from yours.

Mr. WHITE—Well, you have to get permission there, too, just the same as you have to get permission under our law where the Act is in force in the municipalities.

Mr. KNECHTEL—I understand, but it seems to me that the laws conflict in this respect that in New York State fires may be set from June 10 until September 1.

Mr. SOUTHWORTH—They can set out fires on the other dates by your permission ?

Mr. KNECHTEL—They must have permission at any time to set fires. I shall read the law again :

"Fires to Clear Land.—Fallows, stumps, logs or fallen timber shall not be burned in the territory hereinafter described from April first to June tenth, both inclusive——

Mr. SOUTHWORTH—That is without permission ?

Mr. KNECHTEL—With permission.

'From June eleventh to August thirty-first, both inclusive, such fires may be set therein if written permission of the fire warden or district fire warden of the town or district in which the fire is set has been first obtained.'

Mr. SOUTHWORTH—In the spring and fall they cannot be set at all ?

Mr. KNECHTEL—They must not be set at all.

Mr. SOUTHWORTH—That differs from our law.

Mr. KNECHTEL—Now, I presume that the reason for our law is that in the spring of the year the leaves are dry; the green leaves are not on the hardwoods and the soft woods or conifers are as easily burned then as in the summer time. I remember last spring when we were making a plantation at Saranac Lake, a little after the train passed by on the railway I noticed smoke and two men were sent to see if they could extinguish the fire. They called for some help. We had sixty men planting trees and we immediately took the whole force up there and put out the fire, but not until it had burned over fully an acre of ground. Now, our system, although, perhaps, it may not be as good a system as the patrol system, has worked very well. I am inclined to think the patrol system is an exceedingly good one and I think your law has been framed with exceedingly good judgment; yet, we have been successful in reducing the fires very much. In 1902, as shown by the reports of the town fire wardens, the total area to which it was applied was 21,356 acres, three-quarters of which, or thereabouts, consisted of waste land on which there was no standing timber of merchantable value. The actual area of forest land overrun by fire was 4,345 acres, of which only 458 acres belonged to the forest reserve. The total loss on this standing timber amounted in the aggregate to $9,150. I regret that I have not the figures for former years, but I am sure that the area burned over has been reduced since our fire warden system has been established, five or six times.

Prof. MACOUN—There are three or four points in this matter of fire guarding that are worth thinking about, and one is just what has been brought forward by this gentleman. He says that in New York State they prohibit fires in the early spring. It is sound wisdom. We all know that on a hot day in spring the slightest fire will burst into flame and run over the country in no time, and again the same in the autumn when the leaves come off. That is certain. Now, the question is if we are not discussing two distinct parts of the subject. When we speak of the timber always, here in Canada, we talk of the lumbering limits, we talk of the northern parts, not of the parts in which the settlements are. Hence your law is more applicable to our farming communities. I do not mean to say that yours is not a better law than ours, because it prohibits in spring and autumn the setting of fires, which is sound wisdom, and it only allows a man to set out a fire in the summer time when it is the least liable to run and hence more safe. But, I leave that because you can all see what it means. There is another point; in the discussion this morning the matter was brought up that the Parry Sound railway was one of the roads that was run through a timber country and caused no loss, and the reason was given. When you have heard Mr. White's statement in connection with what the rangers are doing you can see at once why. When they were putting the railway through the country the fire rangers of the Government and of the lumbermen controlled the railway authorities in that way, they prevented the railway employees from being careless in regard to fire, and the result was perfect safety. Hence, there is no use in talking about it, because, when a railway runs through the country there is going to be enormous loss if the railway authorities are not compelled by the Government to look after their own lands and to control the actions of their men. You heard, this morning Mr. Joly say that in twelve miles of their forest, in Quebec, they had two gangs of men patrolling the railway after every train had passed across the forest. After every train passes over a gang is set out to put out any fires that are started in their incipient stage. We men who are not engaged in lumbering or railway business say that it is the bounden duty of the Government to punish the railways for starting

fires. I have been on the lines of railways in this country and I will mention one instance in particular where the section men would not put out a fire, and I and my men had to turn out and put it out. The section men said they were not required to do it. If it had been required of them we would not have had to do it. Every one of us who has travelled knows that it is the railways that are destroying the country. The Government know that. I will give one instance showing how destruction can be done by men who are irresponsible. I generally get ahead of the railways, and in 1897 I was at the Crow's Nest Pass. Every day of the year a tremendous wind blows out of that pass to the prairie and on towards Fort McLeod. The men engaged in the construction had cut the right of way through, and an immense amount of material which had been removed was piled up. One of the foremen went and started a fire at the outer entrance of the gap. I said, you must not do such a thing, because there is going to be a wind this morning that will burn up the whole country, and if you start a fire you will be punished. He said there is only $200 fine; that is all. The fine is $200. Well, I said, you are doing it and I will inform on you. He started the fire between 9.30 a.m. and 10 o'clock. I came out and passed in a wagon about an hour after, and for a quarter of a mile we had to force our way through fire. That fire extended over an area of 20 miles outside of the Crow's Nest Pass and burned for two days. I met the police that same day and I informed them, and I heard that the man who started the fire paid the $200 fine and said: What is that? I saved a pile of money by it. These irresponsible men do not care. But it is our duty to impress upon the railways the necessity of making the section men look after the fires. There is not a section man in the country that could not patrol the roads. I spent three months, three years ago, in Algonquin Park; I went through that park from one end to the other and there were no fires. I remember upon one occasion I saw a man poking his head through the bushes. I said to one of my men: I have no doubt that is a poacher. No, my man said, that is one of the fire guardians, and he is just looking down the lake to see if there is any smoke in sight. Algonquin Park is patrolled by the rangers of the Ontario Government and the rangers of the lumbermen, and the result is perfect safety. Only one little fire took place that year and they were rushing to it from every quarter, and they put it out in no time. Efficiency comes from supervision and the supervision must be perfect. The supervision of the railways extending through our mountains and forests must be absolutely perfect or there is no safety, and we may just as well make up our minds to that. We know now that there can be safety. There is one property down in Quebec that is safe, because the owner looks after it himself in a very efficient way. There is another property that belongs to the Ontario Government on the line of the Parry Sound railway. I have known Mr. Booth well for many years, but it is not his business to look after the road. If it is made his business and the business of the Ontario Government, and the lumbermen generally, to patrol the whole country perfect safety results. Some of us get passes from the railways and others do not, and of course when a man is getting passes from the railway it is not safe for him to talk the way I am doing, because if he does he will not get a pass. That is the trouble, but it is our duty, who do not get passes, to come out squarely and say that the railways are destroying the country, and that the Government is winking at it and will not have the thing stopped.

Mr. JOLY DE LOTBINIÈRE.—If I may be permitted to add a few words to those just uttered by Prof. Macoun, I would say that I am one of those gentlemen here, and I daresay there are a good many, who have not the privilege of receiving railway passes,

and, therefore, I find myself in the happy position of being able to speak out my mind freely even if it is against a Government railway. I take it that a government railway such as the Intercolonial railway should be one of the very first institutions in this country to give an example as to how protective measures should be carried out along the railway lines. If there is any damage or danger they should be among the first, unless gross negligence is shown on the part of the limit holder, or unless proof is made that the fires were not set by their engines, to acknowledge their responsibility in the matter. I wish to put before you, gentlemen, the position in which the unfortunate property owners are where railways are passing, and in order to do this I will give an instance that occurred with us last year. It was during a drought that happened in May, and which continued until about the beginning of June, when the rains began to come down. I was at our mills, some distance off, when I received a telegram stating that a serious fire had started on the line of the Intercolonial railway, and to come as quickly as possible. I was about twenty miles off and I had to make a detour and I got to the scene of the fire about midnight. I found that the fire was then under control. Four or five acres of timber had been burned, stumps and dead trees were still flaming, but the fire was under control. Subsequently, I may say, the railway section men belonging to the Government gave efficient aid, together with the men I had patrolling, and others sent over and paid out of my pocket from the nearest village. Shortly afterwards I had this tract of land examined by an expert and made up a bill of damages which did not amount to very much, but it was more for the principle of the thing that I wished to have recognized, and I asked that an investigation should be made as to the cause of the fire. The Government granted an investigation, a commissioner was sent up, fixed a day for holding the investigation and asked me to bring my evidence on that day, which I did. I proved that I had men on the line that day patrolling that portion of the road. I proved that such and such an engine set fire in the course of six miles to the extent that five incipient fires began along the right of way working their way into the forests; that my men put out four and that by the time they had extinguished these the fifth had got such headway that with the half dozen men who were there it was impossible for them to cope with it and it was necessary for them to call for further aid. I proved that all the fires had occurred on the right of way and therefore, the evidence was perfectly clear that this particular engine had set the fire. Well, the Government in a case of that kind, far from acknowledging its responsibility, sent me an answer in a short time stating that as no proof had been made as to the origin of the fire, that such and such an engine dropped the spark that caused that fire, and that as the Government had proved that all engines that went to Point Lévis on such and such a day had their fire screens in perfect order there was no redress for me. Now, as to the inadequate condition of most of these engines we all know that at a central point—Point Lévis in this instance—it is a mere form which is gone through. Every engine is supposed to be reported upon before leaving for Montreal as to the condition of its fire box, fire screens, and so on. An official is supposed to look at the fire box and to see that the meshes of the screen are of the proper size, but as a matter of fact this is not done, and if it is not done by a Government railway, and done efficiently, I am quite sure there is very much less chance of its being done by a private corporation. I think that some suggestions should be brought before the Government on this question. I have thought over the matter seriously and I think that locomotives leaving a given centre and about to traverse forest lands should not be left to the inspection of the railway authorities, and it should not be left for them to say whether the engines are in

proper condition or not. I think that the Government should appoint a special man at each point of departure, where the engines are going to traverse forest lands, to make a careful examination of the engines and see that the fire boxes and screens are in order. We all know that it is from the sparks that fires originate when the engines are going up grades, and so on. If adequate measures were taken in the matter of fire screens nine-tenths of the fires that happen would not take place. No precautionary measures are taken to see that the equipment of locomotives is such as to minimize the danger from sparks. I think it is the duty of this Association to take this matter up very seriously, because if a locomotive sets a fire it comes from the smoke stack and not from the fire box, and it is a matter which should be most carefully looked into.

Mr. STEWART—I just wish to say one word on the subject of railway fires in the country. There is no question at all that in a great many cases they do set fire; that is if the sparks come out and light in the forest when it is dry. I have had a great many conferences with the Canadian Pacific Railway Company in Montreal and also with their agents in the West and the General Manager has telegraphed to his superintendents that they must enforce the Act. Most of the Acts of the different provinces provide that engines must be equipped with fire screens, the result is that this last season the Crown Timber agent in the railway belt of British Columbia informs me that they had no trouble in that regard and that in the railway belt we had no fires although it was one of the dryest seasons in British Columbia while outside the railway belt there were a great many fires. There is no reason why the railway company should not join with the Government and assist in keeping down fires. I think that the officers of the Government and the railway authorities should get together and work for that purpose. In regard to examining fire screens we talked over that too. They may have a fire screen which is all right at the point of starting but when they come to a grade and the engine gets stopped they raise that screen until they get through and then put it on again. This last season I have had the C. P. R. and the Canadian Northern furnished with fire notices all through that country for the guidance of section men, and the result is that all along the line these notices were posted up and they had instructions through the agents to observe the regulations under the provisions of the Fire Act. I know the result has been that there were very few fires.

Mr. CHOWN—I am a Methodist and as you are aware one of the doctrines of the Methodists is that you should go on to perfection. We have had a most interesting account by Mr. White of the working of the system in the province of Ontario. The system, I think, is very nearly right, but I would like to make one or two suggestions which I think might help to make it a little more perfect and I think this Association might assist. I would like to suggest that we bring pressure upon the Government looking to the employment of a larger number of fire rangers on the Crown lands. Those who have travelled through the Crown lands and especially those who have talked with men from the Geological Survey who have travelled through them, will be impressed with the necessity for a larger number of rangers on the Crown lands. Another point is more important and that is the necessity for some manner of controlling the force of rangers. The present system is not perfect. It would seem that if a man is upon the staff of fire rangers and paid for his services care should be taken to see that he is performing his duty and that he is a good man. As far as my information goes there are a great many fire rangers who are not competent men and who are appointed for other

THE RED OR NORWAY PINE *(Pinus resinosa).* [p. 48]

reasons than that of being competent fire rangers. Of course, Mr. Booth, for instance, is not personally acquainted with his rangers and he gives it out to some of his foremen to appoint the rangers, and anybody who has conversed with men from the Geological Survey and other men who have travelled through the northern parts of the country knows the way in which the fire ranging is done. I recollect hearing the story of a man who was not outside of his own lot for six weeks and yet he was drawing pay all that time for fire ranging. There should be some other system than the mere looking at the diary of the ranger by which some supervision of these men could be had while they are working. Then, another point I wish to speak of has suggested to me that Presbyterians believe in the doctrine of final perseverance. There is a clause in the report we heard this morning regarding the advisability of impressing upon the different Governments the necessity for controlling the sporadic immigration that is going into the settlements, one, two, or three going upon lands that are not suited to agriculture causing great damage by fire there. We have a clause in the report of the directors this morning which reads :—

'In accordance with the instructions contained in the resolution passed at the last annual meeting on the question of a proper division between agricultural and non-agricultural lands, a copy of the resolution was sent to the Government of each of the provinces, and also to the Dominion Government, and replies were received thanking the Association for the suggestions offered.'

We should not be content with the mere reception of the report, but we should follow this up by pressing on the different Governments the necessity for controlling settlement as far as possible upon non-agricultural lands, and that in advance of all settlements, there should be rangers sent out who should, in a rough way, go over the ground and suggest the territory for the surveyors to lay out. I would impress upon the committee of resolutions, that we draft another resolution and forward it to the different Governments pressing this matter upon them.

Mr. SOUTHWORTH—Mr. Chairman, we have, I am sure, all been very much interested in the very clear exposition of the history and results of the fire ranging system of Ontario, from Mr. White, who is really the originator of the present system. We have also learned, and it was news to me until a few days ago, of the provision that has been made for controlling fires in the municipalities. There is what we call the Ontario fire ranging system, by which the rangers are appointed jointly by the lumbermen and the Government, and by which rangers are employed on the Crown lands, and in this way we have a fairly good system of fire protection. In the ordinary municipalities, machinery is provided by which municipalities can appoint officers with power practically to control the fire protection system there. But there is another phase of this subject that legislation does not seem yet to have reached. I refer to the districts now being settled. In many townships, as we know, there is a considerable length of time before any municipal machinery is provided.

A fire took place in 1901 in the Temiskaming country at a time when there was not an organized municipality in the whole district. The municipality had not power to appoint guardians, as there was no municipality in existence. Would it not be advisable to provide machinery that would enforce the provisions of the Fire Act in unorganized territory? It seems to me that this is a matter that this Association might

very wisely take up, and I think it would be advisable for the Government to appoint or select officers in the various sections of the new districts now being settled, from whom permission should be obtained before settlers are allowed to set out fires, as in the case of an organized municipality. I am aware that that would give rise to the criticism that it would mean more Government officers, but there are some immigration agents and others who might be employed for the purpose. There is no way at present of controlling the manner in which settlers should obtain permission to set their fires, and I may say that I am inclined to think that the New York State system is possibly in advance of our own. The law describes certain seasons when there shall be no fires set out at all, and during the rest of the year persons desiring to set fires must get a permit, and in a State like New York, where there are organized municipalities everywhere, that can safely be done, but in our country where it is being settled in different parts, there is no such machinery, and it might be well to provide machinery for that purpose.

Mr. STEWART—A good deal has been said about the system of Ontario and we have heard something of the system in Quebec of appointing forest fire rangers. I want to say a word or two regarding the supervision of these rangers. In framing some rules for the Dominion some few years ago I had a pretty broad hand and I had before me the Fire Acts of Quebec, Ontario and other provinces, and I worked out a system that is giving good service in the West. As I said this morning, that which perhaps would be suitable in one district would not be suitable in another. There are certain officers of the Government, Crown Timber agents in the timber districts. We put the fire rangers under these men; they have to certify to their accounts, they have to instruct them when to go out, and when to return. Generally on the Pacific coast these men are out early in the spring, and then during the summer when the trees are in full leaf they are very seldom out at all. They are withdrawn, and then sent out again in the fall if necessary. If it is not necessary, if it happens to be a very wet season, they are not called out at all. If it is a dry season we not only call them out, but the rangers themselves have authority in the case of fire to employ assistance and the accounts are paid when they are certified to by the supervising officer. That system has worked well. In making out the accounts how are these men paid? There is an assessment and the assessment is made in this way: The country is divided into a certain number of districts and each ranger is assigned to a certain district. In that country there are many times more unlicensed lands than there are lands under license. We employ the rangers. If there is a large number of lumbermen in the district we try to get those rangers that would be satisfactory to the lumbermen as well, but the Government have charge of them and they make an assessment based on the area of the timbered land in which the district is situated, whether it is really merchantable timber or not because we like to preserve the young growth as well. We take the whole timber area, then we take the quantity that is licensed, then we take the account for a particular ranger for his services there that year, a certain amount is found to be the cost per acre, the government pay the whole of it as regards the unlicensed lands and pay one-half on the licensed territories and it is assessed against the land. That system has worked well there. It might not work well here. I think, moreover, that the supervision is one feature I would not like to have altered. I know it is a check because no accounts are paid until the supervising officer assents to them.

The CHAIRMAN—Mr. McCuaig said something on the subject of forest fires, but, of course, there has been new matter introduced into the discussion. Is there anything more he could say on the subject; if not, we will ask Mr. Cormier to address us.

Mr. MCCUAIG—There is nothing to add to what I said this morning, perhaps. I said that the system we have in Quebec did not differ very much from that which obtains in Ontario. We appoint our fire rangers, the nomination is left largely with the lumbermen who, we consider, are equally interested with the Government, and even more so. We receive the nomination of these men from the lumbermen on the condition that they are qualified men. These recommendations are sent to the department for appointment so that a fire ranger after he is appointed once is always a fire ranger. He is eligible for duty at any time just the same as a culler. He goes to work and does his work with the approval of the license holder and the superintendent. He has to report to us at the end of every month. I understand that in the province of Ontario they lose sight largely of their fire rangers at the beginning of the season and that they do not report until the end of the year. It is not so with us, they have to report every month. More than that, these reports have to be made out in duplicate and they are required to swear to the accuracy of the statements they submit. No man is appointed unless he is qualified for the work from every point of view. It is true that he may be qualified to-day and in four or five years from now contract some habit that will unfit him. I have had to dismiss several fire rangers because they were unfit and I have found some of the license holders who have not been willing to take this course. The lumberman who has such extensive business interests appoints a man in whom he has confidence to attend to these matters for him. He looks to his agents to see that the law has been carried out, and he does his best, but experience shows that you must have efficient supervision in order to control the fire rangers. They are not all angels. There are good men amongst them, but unfortunately we find some of them who are not fitted for the work. I impress upon license holders that we require the best men available and I also impress upon the men that their duty must be done without fear, favour or affection. I was approached by a man who wanted to be appointed a fire ranger and when I heard what his idea of the duties of a fire ranger was I told him that he might as well go home because he would never fill the bill. If there is any man who should not be a drone it is the fire ranger. He must always be on the alert. Owing to the dryness of certain seasons of the year the patrol cannot always be made and the rangers are allowed some liberty but they are always expected to be on duty. They must also be impressed with the necessity of dealing as gently and kindly as possible with the settler. They must come into contact with the settler. Their instructions are to be careful and not use harsh means towards the settler, but they must make the settler aware of the damage caused by fire and impress upon him the necessity of being careful about the use of fire. Most of the fires that have amounted to anything have come from the settlers because new settlers are allowed to go upon land which they should never have been allowed to occupy. No man should be allowed to go and settle on a section because there is the making of one or two good farms in that locality. He should not be allowed to go there at all. He is only endangering valuable property by his going there. I am sorry that we have not a sufficient number of fire rangers in the province of Quebec. Mr. Cormier has charge of the lower part of the province, and it is something surprising how much we have been able to do with the handful of men we

have. It is true that the lumbermen owning limits appoint special rangers and that the Government co-operates with them. These special rangers are completely under the control of the license holder, he can put them out and take them in, but they are clothed with authority and in fact given magisterial powers. If they meet any man in the forest they are supposed to ask who he is, what his business is, and these people are supposed to give an answer to what they are asked. The rangers are supposed to know what the traveller's business is and to follow him up and keep in touch with him. We have an army of men travelling through the licensed limits, hunters, miners, wayfarers, and the fire ranger is continually meeting these men. They are a source of danger. We cannot stop it, the only thing we can do is to keep our fire rangers alert and active. I am glad to be here because there are many lessons which have been given which I shall be glad to make mention of in making out my annual report. I am glad that we are all interested in forestry either from the commercial, the sanitary or the sportsman's point of view. In the province of Quebec we shall have a new country opened up in the north which will increase enormously the interest in the work of protecting our forests. The Quebec Government appointed a Commission two years ago to take into consideration many of the questions that we are considering here to-day. The recommendations of this Commission I expect will come into the department before long.

Mr. N. E. CORMIER, Superintendent of Forest Rangers for the Province of Quebec, Aylmer.—Mr. Chairman, the question brought up, I think, has been very ably discussed by the gentlemen who have spoken this afternoon. However, I may be able to tell you something of the conditions in the particular province which I represent. The provisions of the Act regulating the forest protection service in 1893 were very limited. In that year the Hon. Mr. Flynn, who was then Commissioner of Lands, Mines and Forests, requested me to organize what we call No. 1 fire district according to the Act. I went down, travelled through a very large district and divided that immense territory which my colleague has charge of into 32 districts, requiring a fire ranger for each district. In the province we do not put fire rangers on one particular limit, as a fire ranger may have charge of two limits. But, the fire ranger of one district must join the fire ranger of another district and discuss the best method to be adopted in order to prevent fires in the summer time. In 1893 I called a meeting of the lumbermen here which was largely attended, and after a discussion it was agreed that the taxation, which was then ten and a half cents per square mile, should be raised to seventeen cents per square mile if the Government would give as much more, which would make the appropriation for the service thirty-five cents per square mile. The lumbermen agreed, and the department did so. In the spring of 1894 we established fire district No. 1. It was well understood at that meeting that the fire protection service in district No. 1 should be non-political. I think it was so at the time of its establishment, and I think it is so to-day. It was agreed that the lumbermen should make the selection of the fire rangers because the limit holder has more interest than the government in protecting the timber, although we must all admit that the government must help the lumberman to protect his immense interests. In 1894 the lumbermen made their selections, they were approved by the department, and on being approved the rangers were vested with authority. They were authorized to arrest anybody found breaking the law, to hold court in the bush, to appoint constables, to bring a man who set a fire before them for trial in the bush. There is a great deal to be said upon the question of the prevention

of forest fires, and under some circumstances it is rather a hard task. I have studied this subject for several years, and the more I study it the more I learn. I have learned a great deal to-day from the very able remarks that have been made on the question of forest protective service. The greatest danger is from settlers, the next from hunters, and the next from explorers. Under our mining law an explorer must get a permit, and our fire rangers are instructed to see that every explorer is provided with this permit. I have here a book of instructions to the fire rangers which I shall be glad to place in the hands of any gentlemen who may wish to see it. We have ejected several people who have not had permits to come in. The tourist is a source of danger as well as the sportsman, and the only way to prevent forest fires, I believe, is this: We have to go round and see the settlers, take them into your confidence, explain the law to them, and tell them the danger of setting fire and that they may be compelled to pay a fine for breaking the law or go to prison. You must take them into your confidence and then there will be no further trouble with them. Last year we had three cases but I went into the locality in which these settlers were and they promised that they would not set fire again. District No. 2 extends from the east bank of the Gatineau river to Lake St. John, while the district of Mr. McCuaig is from the west bank of the river to the height of land. In my district we have about 20,000 square miles. The total area of the province under license is 60,862 square miles, as announced in the House by the Prime Minister the other day. I understand that my colleague has 32 fire rangers under his control. I have 22 and I expect to get the number up to 30. Below Lake St. John I think we have about half a dozen. That portion of the province is not organized yet.

I heard the gentleman from New York State speaking about requiring permission to set fire. I do not see why this is wanted. In Quebec province you cannot set fire in district No. 1 between the 1st of May and the 15th of September, and in No. 2 district between the 15th June and the 15th September. The minister cannot give a permit, because it is in the statute. We cannot give a permit, and I think it is the right way. During the past year we had three settlers who set fire in July and August.

The superintendents have control of the fire rangers, guided by the license holder who has recommended them, and when we find by their reports that they are not doing their duty, we call them to account. Their reports must be made monthly and sworn to before a Commissioner or a Justice of the Peace, but in the fall of the year when they come in they must have duplicate copies and these must be sworn to before the proper authority. When we find out that they have not done their duty we communicate with the lumberman who has appointed them and they take the matter up. I have nothing to say against the lumbermen because the lumbermen have done the best they could for the protection of their property, only that we should have more fire rangers. It is a question of more money, and it is a question whether the Government will be content with an increase in the tax.

In regard to municipal machinery we have not that in our province. I have not much confidence in it unless the council can act at once. If the council has to pass a by-law and get a lot of ratepayers to sign the petition it takes too long, but if the municipality had power to appoint a man and then submit the appointment to the department, and the department approved of the appointee and vested him with sufficient authority it might be all right.

We also issue a book of instructions to the license holders' agents, and we require them to issue orders to their foremen to have the Fire Act read say every Monday morning so that none can be in ignorance. The fire law is read on the drives every Monday morning to the men who make fire or who smoke so that they may not be in ignorance. I am very much pleased with the invitation given to me yesterday by Mr. Campbell to assist at this forestry convention. I can assure you that if I can do anything to promote the success of the meeting I shall be ready at all times. The Association have a great deal to do. They have to deal with a very valuable asset of the Dominion of Canada, and from their deliberations good results must inevitably follow. I hope in future that we will have no more disastrous forest fires.

Mr. KNECHTEL—My friend who has just spoken wishes to know why a permit should be obtained to set fires. During two months of the spring and two months in the fall we prohibit fires being set. They cannot be set even by obtaining permission. Then, during the summer months fires may be set provided permission is obtained from the fire wardens. It seems to me that this gives the fire warden an opportunity to see that a fire set by a settler is properly controlled and does not extend to the territory adjoining that of the man who sets the fire. That is the reason why we require permission to be obtained.

The CHAIRMAN—This morning some members of the Association were not able to get copies of the directors' report. I am happy to say that a number of these copies have been prepared and any one who would like one can get it now. There will be a meeting to-morrow at 9 o'clock of the Committee on Resolutions.

Mr. WHITE—I have listened with a great deal of interest to the very kind remarks that have been made by Mr. Booth and Mr. Robinson, and the tone of approval generally that has prevailed in respect to the Ontario system which I endeavoured to explain to you this afternoon. There has been very little criticism of it; the only serious criticism that I have heard has come from my friend Mr. Chown. He seems to think some closer supervision than we now have over the fire rangers is necessary, and in proof of the necessity for that he cites the case of one fire ranger who was said upon the authority of somebody in the Geological Survey to have been absent from his post for six weeks. I do not know what the officers of the Geological Survey were doing around that particular settler's house or region for six weeks. If I were interested in the Geological Survey that might with just as much reason become a matter of inquiry for me. I am still of the opinion that, having regard to the way in which these men are appointed, having regard to the purpose for which they are appointed, and having regard to the enormous interests that are at stake in their appointment, that is, the proper guarding of the immense wealth of the lumbermen from destruction by fire, the lumbermen exercise a good deal of caution and discrimination in the appointment of these fire rangers. I am not willing to believe, without better evidence than I have heard this afternoon, at any rate, that the lumbermen so far neglect their own pecuniary interests as to foist men on the fire ranging service simply to give them something to do. As to any better system of superintending these rangers it has been proposed that we should keep our regular forest rangers on duty the whole year, in order to supervise the other rangers. Well, perhaps if we did that, we should get more information about them and

perhaps they would stick a little more closely to their duty. I am afraid that the legislature will not be inclined to vote any more money at the present time for this service. If we were to create such a staff to look after the fire rangers, I very much fear there would be difficulty in getting the money. I am sure the lumbermen and the men in their service will agree that they exercise great care in selecting these rangers. Of course it goes without saying, that the lumbermen themselves cannot select every man, that they have to leave it in the hands of their superintendents, who know the men a great deal better than the lumbermen themselves know them, to pick out their best men to perform this service. I am unwilling to believe that men are foisted on the service with the object of giving them employment. Mr. Chown says that he is a Methodist and that he believes in going on to perfection and he says the Presbyterians believe in final perseverance. Well, I happen to be a Church of England man and I believe in going slow and steady in these matters. We have gone slow and steady. We commenced in a very small way with some 35 men, and we have now 250 men employed in the service, and I think the judgment of every one who is familiar with the work is that it is fairly well done. I suppose there are occasional lapses from duty; these will occur in every business, but take the forest and fire ranging service as a whole, and I believe it to be well and faithfully performed. I have had two or three charges similar to that mentioned by Mr. Chown about fire rangers and I have investigated them down to the ground and in every instance the circumstances were not as they were alleged to be. Whenever we hear of a case of this kind we investigate it, and if Mr. Chown will get his geological friends to give me the name of the fire ranger in question I will investigate his case and if he has been acting in that way we will see that he does not fire range any more. These rangers have to swear to the number of days they were employed and that account accompanies their diary, so that we have an opportunity of checking their diary with their account. In addition the lumbermen have to swear that they were in their employ so long as fire rangers and that they did not do anything else than act as fire rangers. Now, if affidavits are any good, and I confess I sometimes doubt the value of an affidavit, I think we have all the evidence we can expect to get.

I am delighted to be here because it is a great thing to have the privilege of coming here once a year and listening to the experience of men from the Atlantic to the Pacific in matters of forestry. The last time I had the honour of attending a forestry meeting it was in the good old city of Quebec, and it was the meeting of the American Forestry Association. I look back upon that meeting with a great deal of pleasure. The Quebec Government, of which Mr. Mercier was then Premier, showed us the greatest kindness and hospitality. Those of us, who perhaps were not as good as we ought to be, were taken down to Ste. Anne de Beaupré in order that we might get the benefit of absolution if we required it, but some of us did not need it and those who did need it had not time to get it. My friend Mr. Blue was there. I do wish, if it were possible, that you could induce the American Association to hold another meeting in this Dominion, and I would suggest that it should be held in the summer time, when everything is bright and the trees are in leaf, that we should take them into the forest, up to Lake Temiskaming and hold it at Mr. Lumsden's hotel, or some place up there. I think it would be a most enjoyable outing and they would have a most instructive meeting.

The CHAIRMAN—I hope that Mr. White will send an invitation to these gentlemen to come here and I think if he does, they will probably come. I believe that the meeting of the American Forestry Association in Canada has done a large amount of good.

Prof. MACOUN—As a member of the Geological Survey staff and a Presbyterian I would say that I believe in the perseverance of the saints. I am satisfied that the member of the Geological Survey staff that had that gentleman under observation for six weeks——

Mr. CHOWN—Well now, I would like to say that this gentleman did not get his information because he was there all that time. He was passing up on his way to the height of land. He was there when he passed and he was there when he came back six weeks later. He had every reason to believe that the ranger had never been away at all. I had no intention of casting any aspersions on the work of the department in connection with this service. Everybody who has studied forestry knows the excellent work that has been done and how much we owe to Mr. White for the interest, for the foreknowledge, for the prophecy he has had in connection with forestry supervision. I took the opportunity of making a suggestion which I thought might help to improve the service of which we are all so proud, but not with the idea of casting the slightest slur on the excellent work Mr. White has done on behalf of forest supervision.

Mr. WHITE—I never thought that you did.

The CHAIRMAN—I believe the Government should exercise some supervision over these men because it is very important.

The Chairman called upon Mr. R. H. Campbell to read a report of the Forest Fires of 1902, prepared by instruction of the Association.

FOREST FIRES IN 1902.

(Prepared by Instruction of the Annual Meeting, 1902.)

The season of 1902 was very wet throughout the greater part of Canada, so that fortunately the loss of timber from forest fires has been comparatively small, but this danger is still as pressing as ever, for the fires have been quite as numerous in the dry parts of the season and some of them have caused considerable loss, while others were only prevented from doing so by the most strenuous efforts of the fire rangers and others. In order to obtain the information included in this report it has been necessary to appeal to the kindness of the gentlemen who assisted in this work previously, and to them the thanks of the Association are due.

Nova Scotia.

In Nova Scotia the Department of Crown Lands has, at the instance of the energetic Vice-President of the Forestry Association, been making a careful inquiry in regard to forest fires and forest management generally. Replies have not been received from all to whom application has been made, but it is the intention to push the inquiry until the fullest possible information has been obtained, so that the Government may be in a position to know the conditions that have to be dealt with in any scheme for a more advanced administration of forest lands.

In regard to forest fires, it appears from reports, that the damage done during the year 1902, was not as great as that for 1901, although there is a difference of opinion with respect to the matter. One fire alone is represented by one person to have caused damage amounting to $150,000, but he appears to have known that the fire was more

APPEARANCE OF AN AVERAGE PRAIRIE HOMESTEAD WHEN FIRST SETTLED. [p. 56]

extensive than did others who reported it. It appears to be certain, that the area burned over in 1902 was greater than that burned over in 1901, but a considerable portion was not at the time well timbered land. It should not be forgotten, however, that much of this land might in a few years begin to produce timber. The fire has put this result back perhaps two generations. There were over 25,000 acres of forest burned and the loss was certainly over $100,000. Perhaps it may have been double.

The approximate value of firewood produced at $2 per cord, was $150,000 and this was required for home consumption. About 300,000,000 feet of lumber of all kinds were undoubtedly produced for home consumption and exportation, more than one-half of which was sent to trans-Atlantic ports. As to the trees which are considered the most desirable to encourage, spruce is generally, though not always, the first mentioned, with the pine second. Oak is first mentioned amongst hardwoods, followed by birch, yellow and white, maple and beech. Hemlock and fir are also considered profitable in some localities.

Particulars from some reports may be given. A report from Yarmouth county states that the Crown lands cover an area of over 100,000 acres and a larger part of it is what are called 'barrens,' that is, land which was fire swept years ago. Last year about ten square miles of the beginnings of forest were burned for the purpose of making blueberry barrens. If this land were protected, it is convertible into good timber land.

In Shelburne county there were numerous small fires which did great damage to the future interests of the country and an area of probably ten miles square was destroyed. It is difficult to estimate the loss, for it will require a very long time for the reforesting of the district, even should no fires be allowed to cross the region again.

Attention is called in two reports to the danger from excessive cutting. In Digby county it is represented that the cutting of 'spiling', taking thrifty young trees from 8 to 10 inches at the butt, is taking the life out of the forest and is a practice that should be stopped. In Hants county it is stated that in many cases the lumbermen are cutting everything down, to trees as small as sixteen feet long and six inches at the small end. Consequently there are no small trees left on the ground to grow and even if the land escapes forest fires, it will be more than a generation before there is any more lumber to cut.

New Brunswick.

In the province of New Brunswick, the summer of 1902 was very wet and there was little need of wardens to look after forest fires. The province escaped particularly well, as it appears from the records of the Crown Lands Department and correspondence had by that Department with prominent men in each county that comparatively little damage was done. In the county of Kent only, was there a fire of any proportions. Quite an extensive fire took place in that county early in May, which destroyed timber on both granted and Crown lands, but it has been impossible to ascertain with any accuracy the extent or value of the timber destroyed.

Prince Edward Island.

In Prince Edward Island the statement is made that fires were not at all prevalent and no reports of forest fires were received by the Department of Agriculture during the past year.

Quebec.

The Province of Quebec escaped without serious loss during the year but this result is probably mainly due to the wetness of the season as many fires were started. In fire district No. 1, or the Upper Ottawa, the exact number of fires is not given but there were eight that were sufficiently serious to require an expenditure of about nine hundred dollars for their extinguishment. Three of these fires were caused by fire from

locomotive engines, three by carelessness on the part of river drivers, and others were caused by settlers and lightning. The rangers employed in this district were twenty-nine regular and twenty-two special, a total of fifty-one. The holders of timber licenses urge an addition to the number of fire rangers and the Superintendent suggests an increase of five. In fire district No. 2, there were 79 fires reported, 47 of which occurred in May and 15 in June, one in July, 10 in August and 6 in September. One was caused by Indians, one by fishermen, the cause of four is unknown, and the remainder appear to be due to fires set out by settlers. The extent of the fire and the loss occasioned thereby has in most cases not been determined but the reports submitted speak for example of the burning of about 1,500 young pine, 10 to 12 inches on the stump, of the destruction of a small mountain of young pines about one mile long by about six acres wide, of the burning of 2,300 logs valued at 50 cent a log. The setting out of fire by settlers is a question that is found difficult to deal with and the Superintendent repeats his suggestion that the season within which fires may not be set out should commence at an earlier date and that the rangers should be vested with larger powers. That the law in this respect is not observed is shown by six specific instances reported by one ranger in which fires were set out by settlers in contravention of the statute. The number of fire rangers in this district was twenty-two and they had to patrol and safeguard a tract of 17,824 square miles. In the Gatineau district the average area for each ranger was 360 square miles, on the Lower Ottawa 585 square miles and in the St. Maurice Agency 1,316 square miles.

The total amount expended in the province for the protection of the forests from fire was $17,000 but the fire tax brought in the sum of $7,306, leaving the net expenditure $9,694. This to protect a revenue of over one million dollars.

Ontario.

The returns of forest fires in Ontario have not yet been completed so that details are not available. There was one fire in the early part of the season in the vicinity of Madawaska which was kept in check only by the most strenuous exertions of the fire rangers and the employees of the Parry Sound Railway. Fortunately it was confined to timber that was not of much value but it came dangerously near to one of the most valuable timber limits held by Mr. J. R. Booth and also threatened destruction to the village of Madawaska. There was also a fire on the Mississaga river but it is understood that the damage caused by it was not heavy. One occurrence of special importance is the treatment meted out to some tourists in Temagami Park who carelessly left fire burning behind them and would not turn back to extinguish it even when urged to do so by their guides. These people were captured and each of them was required to pay a fine.

The number of fire rangers was 234 and the expenditure by the Crown was $34,200. The revenue from the forests for the past year was $1,505,000.

Manitoba.

In Manitoba and the North-west Territories the season was also favourable and no serious fires have been reported. In the Turtle Mountain Reserve the young growth is coming up in a satisfactory manner. The fire break running through the reserve from north to south has been kept well cleared and no fires got within its boundaries although it was only by diligent watch that it was kept from coming in on the south.

In the Riding Mountain district no fires of importance occurred.

British Columbia.

The only province of Canada in any part of which the season was dry practically throughout was British Columbia. All through the railway belt innumerable fires occurred, the majority of which were set by settlers clearing their lands, while others

were caused by sparks from locomotives and fires left carelessly by campers. These fires were carefully watched by the rangers and promptly attended to. As the Railway Belt is covered by Mr. Leamy's paper elsewhere it will not be necessary to go into particulars.

On Vancouver Island the fires were mainly in the Nanaimo and Cowichan districts. In South Nanaimo one fire caused a loss estimated at $25,000, and in Cowichan at least three fires threatened to be serious and were kept in check in two cases only by hard fighting, chiefly by the employees of the lumber companies. Reports from the Cassiar, Cariboo and Lillooet districts show only a few small fires, and in Yale district the only one of importance swept the cattle ranges at Vernon. In West Kootenay the only serious fires were in the vicinity of Nelson. In Wild Horse valley a portion of a fuse from a blast started a fire which covered an area of nine miles long and two miles wide on which stood one of the finest strips of timber in the province, and one that was badly needed. In addition, this fire destroyed the buildings of the Roanoke and Tamarack mines, the Ymir mine saw-mill and four other mining properties, besides 1,800 cords of wood. In East Kootenay the village of Michel suffered seriously from a fire which started on June 9 on land on the outskirts which was being cleared. Twenty-four buildings, including the post office, were destroyed and also considerable of the property of the railway company. On August 9 a fire occurred close to Fernie which placed the town in danger. A resident of Fernie states that during the last four years bush fires have been frequent in that section, and to his own knowledge 200,000,000 feet b.m. of timber has been destroyed. The estimate may be high but certainly the destruction has been very great and there is no likelihood of its decreasing unless some active measures are taken. The fires have been caused mainly by the carelessness of hunters and prospectors and by persons clearing land, and would appear to have been preventible if care had been exercised. This is established by the fact that, as reported from Nicola in Yale district, no fires have occurred in that vicinity, though traversed a great deal by prospectors and Indians, they having learned to exercise care in the handling of fire. For a province situated as British Columbia, with its immense forest areas of comparatively low, though increasing, value, the prevention of fires is the main object which can be directly accomplished. Something more in the direction might be done by the advertising of the Bush Fires Act by means of posters in all places traversed by the public and by the direct influence of the agents of the Government, by impressing strongly on such agents their duties under the Act and requiring that they be carried out, and probably by the appointment of additional officers for the dangerous periods of the year in such districts as that in the vicinity of Fernie where settlement is advancing rapidly.

In view of the statement by a British Columbia Timber Inspector referred to in the Annual Report of last year to the effect that 'fire is the great enemy and can no more be prevented in a forest than in a town, which in spite of fire brigades and insurance companies it burns up not infrequently' I thought it advisable to secure the views of some of the members of the Forestry Association in British Columbia on the question.

Here are some of the replies :—

From a lumberman : 'There is certainly no question however but what there is a very large amount of very valuable timber destroyed by fire in this province, as well as in other sections of Canada, and I firmly believe that a properly organized system of fire ranging would be most valuable in reducing to a minimum the number of forest fires which are started in various ways during our dry season in this province.'

From another lumberman : 'We trust that the Association will take the strongest possible ground in support of the continuation of the fire ranging system in the British Columbia Railway Belt. We have had at least one case the past season in the Columbia River valley where a fire started and if it had not been for the prompt action of the Government fire ranger in putting out this fire after several days' hard work, the first high wind would have caused it to spread and burn a good many feet of valuable timber. If the number of fire rangers along the railway belt is doubled next year and good men selected, we are satisfied the effect will be good and are perfectly willing to pay our share of the expense.'

From a newspaper editor: 'Do not for one moment entertain the idea that there is no use in an efficient system of fire ranging. Such work is invaluable.'

From a capitalist and rancher: 'My opinion of the work done by the rangers throughout the railway belt this year is that they have certainly done a great deal of good in preventing the spread of fire in the timber in this portion of the country, but on account of the lack of co-operation on the part of the Provincial Government not nearly so much good has been done as might have been.'

From a rancher: 'We all know fire is the great enemy. That is the great need for fire brigades and all fire protection. The work of the fire rangers in this province in the short time they have been inaugurated has been the means of saving immense tracts of valuable timber. Their work being chiefly of a preventive character (which is certainly the best way to cope with a fire) if prevention is not better than cure, I have nothing further to say. Burglaries exist in the face of police protection, but it would be extremely absurd to do away with these because each and every offender is not brought to court. I beg to submit if some effective fire protecting system did not exist our homes and belongings would be all in jeopardy with each recurring summer.'

The forest fires in Oregon and Washington States are a great object lesson. In those states fires occurred that devastated an area of 600,000 acres, destroyed timber and property valued at $12,767,100, including $922,000 of farm property, left 250 settlers homeless, and caused the loss of over twenty lives. An investigation of these fires was made by the Bureau of Forestry of the United States and, speaking particularly of the fires in Oregon State, Mr. Wm. T. Cox, who made the investigation, states that *all the fires could have been prevented or extinguished before becoming serious had there been rangers in these localities*, as most of them were burning for a length of time before they became dangerous. These fires come up right to the boundary of British Columbia at the Railway Belt, and if similar conflagrations did not occur there it can only be attributed to the preventive work done. When we think of the millions of dollars' worth of valuable property gone up in smoke, of the hundreds of wild animals penned in by the fire and dying in pent-up heaps of confused and convulsive agony in the waters where they had sought refuge, of the misery and suffering to human beings, of the families rendered homeless and the lives sacrificed, surely the few thousand dollars per annum which an efficient fire ranging system would cost is but a small thing to place in the balance against the burden of loss and suffering which weighs down the scale so heavily.

In conclusion let me quote the following from the *American Lumberman*, speaking of Pacific Coast conditions:—

'Some people are inclined to scoff at the idea of being able to control forest fires, but experience has demonstrated the value of a forest patrol and a thoroughly trained fire fighting force. There has not been a forest fire of great importance in Minnesota since 1894. The experience of that year taught the state authorities a lesson, and since then there has been a system of fire wardens which has extinguished hundreds of fires, any one of which if let alone might have caused tremendous damage. No patrol system can absolutely insure against disastrous fires in the dry season but with such a system in effect the danger is decreased by 90 per cent or more. Experience everywhere in the old countries as well as the United States demonstrates that the saving of property many times repays the cost of even the most elaborate and expensive system of protection, and perhaps the most thorough and therefore the more costly the system is the more profitable it is.'

The meeting adjourned at 5.30 p.m. to be resumed again on Friday, March 6.

FRIDAY, MARCH 6th.—MORNING SESSION.

The meeting was called to order at 10.30 a.m.

The CHAIRMAN called upon Mr. Norman M. Ross, Assistant Superintendent of Forestry for the Dominion, to read a paper prepared by Mr. A. P. Stevenson, Nelson, Manitoba, on 'Tree Planting in Manitoba.'

Mr. Ross—Mr. Chairman, I have been asked to read this paper that Mr. Stevenson has prepared on forestry work in Manitoba. Mr. Stevenson is an old settler in Manitoba, having gone there some 20 years ago, and for the last two or three years he has been engaged in inspection work in connection with the tree planting that the Government is following in the prairie districts.

FORESTRY WORK IN MANITOBA.

A. P. STEVENSON, NELSON, MAN.

In endeavouring to comply with the invitation of the Secretary of the Canadian Forestry Association to write a paper on the important subject of Forest Culture in Manitoba to be read at this meeting, I am painfully conscious of my inability to do justice to a subject, the proper discussion of which might well occupy the best minds of the province.

I crave the indulgence of the company present, while endeavouring to lay before you some of the reasons which I trust may be of service in awakening a new interest in a matter of vital importance to Manitoba, and in doing so may perhaps bring forward a few facts and items not wholly new, yet of such practical importance as to bear repeating. With line upon line, precept upon precept, here a little, there a little, all important truths are inculcated.

The peculiar weakness of human nature to be in haste to become rich continually acts as a drawback to the sure but gradual accumulation of wealth. The young man of enterprise, industry and ambition is generally in too big a hurry for permanent success. The profits on a quarter-section of wheat, with its speedy returns in ready money within a year or two from the commencement of his work, is more alluring than the slow accumulations through stock raising or tree planting, and their consequent permanent values. The too common but mistaken idea, that it takes too long to wait to get any good from tree planting, must be corrected.

What encouragement have we to plant trees? In the first place we are assured that the planting of trees will accomplish what we seek to accomplish. They will protect from winds, modify the temperature and yield a certain amount of fuel. In the second place, we have good reason to believe that other good effects will follow, that the rainfall will be better distributed, our springs preserved, the air rendered more humid, and fruit culture facilitated.

In the third place, we know that trees will grow on our prairies, if properly planted and protected. It was formerly believed because nature had not permitted them to grow, that trees would not grow on our prairies. This, the artificial groves scattered over our province, as well as our own experience here at home, sufficiently refute.

In the fourth place, we are not pioneers in this business of forestry. The Western States have led the way and have thousands of groves of trees from 40 to 50 feet in height.

Our Government have already well begun the work here, and last year four hundred thousand trees were planted by the settlers in the prairie portion of our province under the supervision of the Forestry Branch of the Department of the Interior. The varieties of trees furnished consisted of Manitoba maple, cottonwood, elm and Russian willow. Ninety per cent of these trees were growing and in a healthy state at the closing in of winter. It will require this spring about one million trees to meet the demands of applicants who are taking advantage of this co-operative tree-planting scheme inaugurated by the Dominion Government. The increasing number taking advantage of this scheme shows that our people are alive and wide-awake to the necessities and possibilities of tree planting in this great region. We have only to keep the ball in motion to produce grand results to show that the encouragement and assistance given will not be tendered in vain.

The objection that the state should not pay a man for improving his own premises, would be logical were the improvement limited to the man's private benefit. Raising trees bears no analogy to raising a crop of potatoes or wheat. They are not annuals, they live after we are gone. They are bequests to our successors. They are factors of climate, of general agriculture, of the people's healthfulness. As rivers and lakes are public benefactions, so are forests.

The framers of our co-operative tree-planting scheme viewed the matter in this light and have built upon this principle. The right of the Government is also recognized to supervise the trees it has paid for.

While such belong to the farms where they are growing and are as inalienable as the soil, in justice to itself the state steps in and declares that they shall not be neglected or removed; that the cutting shall only be by governmental permit to the proprietor of the farm, to the end that such forests shall be preserved for climatic uses and rural beauty.

In order to make a success in growing trees, we must be thorough in the preparation of the land before the trees are planted. They need to be well cultivated until they are large enough to take care of themselves, and unless this is done it is of but little use to think of growing a good shelter belt. After breaking up the sod it is advisable to take off at least one crop of grain before planting trees. The sod will then be fairly well rotted and the trees will grow faster, but without doubt the best preparation is summer-fallow the year previous to planting. The next best is land that has been under hoed crops of some kind. A hoed crop between the rows of trees the first year is sometimes advised, but from observations made the past summer between trees grown with and without a hoed crop, I would most emphatically advise the latter way.

As regards the best kind of timber to plant on the prairies, the adaptability of certain varieties to certain soils must be recognized. Russian poplar and Manitoba maple succeed fairly well on high sandy soil, but cottonwood, elm and ash delight in a deep moist loam.

For early wind-break or shelter from the wind, the most rapid growers are the cottonwood, Russian willow, Russian poplar and maple. These varieties should be the pioneer trees in starting a wind-break.

It is also a matter of no small importance to us to know how best to arrange our trees so as to have them both ornamental and useful. If we would grow tall, straight trees, we must have them planted quite near together; if too far apart they will grow short trunks with spreading tops, which are not desirable.

Experience teaches that the best results are obtained by planting four feet apart each way or 2,720 trees to an acre. There is another benefit derived from close planting, for if well cultivated, in three or four years they will be able to take care of themselves. The mistake most commonly made by our farmers in starting a wind-break is the tendency to plant the trees too close around the buildings—in fact, in their door yards, if possible. One of the chief difficulties met with in laying out shelter-belts for those taking advantage of the Government tree-planting scheme is this desire on the part of intending planters to have the trees close to their buildings. They have to be shown that with close planting up to buildings, the snow will be stopped and piled up just where they do not want it. Their door yards and barn yards will become filled with

snow, in other words, they will have no yards visible and would be quite likely to find themselves wishing they had not planted trees. No trees should be planted within 50 or 60 yards at the very least on north and west of buildings, that is, if planting with a view to a wind-break, and to save the trees in the shelter-belt from being broken down with snow banks it is advisable to have a snow-break of one or two rows of willows on north and west of wind-break, but at a distance of 40 or 50 yards from the latter. This space always to be left clear of trees, and to hold the snow banks in winter.

The question of pruning trees is one which appears to trouble the average tree planter a good deal. There is an overweening desire with a great many people when they get their knife sharpened that they must prune all their trees because it is the style. This is done on the principle that it improves a horse to have his tail cut off. They assume that nature is totally depraved and never can right herself without their intervention. If planted close as we advise, the trees will spire up tall and timber-like and will prune themselves better than do nine-tenths of the intermeddlers.

Another question with a good many people is, which is the proper time to plant trees—spring or fall? The objection to fall planting in this province is, the falls are so short the earth gets cold early. The tree cannot form rootlets in sufficient quantity to retain its vitality during the winter. This seems to be rather queer, as a good many think that the tree does not need any sustenance during the winter, but it is nevertheless a fact that it needs a great deal of it for the reason that every bit of sap evaporated by hard freezing weather must be counter-balanced and furnished by the roots to prevent the tree from getting winter killed. The tree while in dormant condition is by no means lifeless, and the hard winter's frost is a heavy strain on its vitality. This is reason enough why we should not plant any sort of trees in the fall, not in Manitoba.

I might enlarge this paper profitably with a chapter on the preservation of our natural forests. I might also show some of the blessings resulting from extensive forest culture in the favourable climatic changes sure to follow, better sanitary conditions and the promotion of all the material interests of the province, but short and concise is the word, and I will close by saying there is a rich mine of undeveloped wealth in our treeless regions which can only be developed by a comprehensive, broad system of tree planting.

The CHAIRMAN—Is there any gentleman who would like to say anything on this paper?

Mr. W. T. MACOUN, Horticulturist and Curator of the Arboretum at the Central Experimental Farm, Ottawa—I would like to ask Mr. Ross if he finds the Box Elder a straight growing tree all through Manitoba and the North-west. In the east it grows very crookedly. I noticed in Manitoba last winter that it grew very straight. Is that the general rule?

Mr. Ross—As a general rule Box Elder is about the most crooked growing tree we have out there.

Mr. W. T. MACOUN—I noticed at Brandon how straight they were.

Mr. Ross—You mean the ones that were pruned?

Mr. W. T. MACOUN—Yes.

Mr. Ross—You can keep them pruned to a fairly straight tree, but it means a great deal of work. They only grow on the long branches about three or four stems branching from the crown of the trees.

Prof. MACOUN—There is a point in that connection that I may just as well speak about now. Evidently the trees growing in the places where the seed for these trees which have been planted was got were all twisted trees, because these Manitoba maples in some places would rather lie down than stand up. They have learned that habit and if the seed of the trees which are being planted is taken from twisted trees, what can you expect?—like father like son. If the tree from which the seed is taken has for a long series of years been lying down and not standing up, what can you expect? Now, the Manitoba maple, as it grows in the east, here, stands up straight. For instance, I will tell you where there are some maple trees; in the Don river valley, a mile or two from Toronto, the trunks of these trees are higher than the ceilings of this room—fine, noble trunks. I was in St. Paul some 20 years ago and I noticed that all the trees there were straight growing trees. Of course, I made some inquiries, and I discovered that the trees that produced them were the trees that I am speaking of that grow tall. I will mention another place in Western Ontario where these tall growing trees may be seen. If you were at Chatham, right in the valley of the Thames, you would see this Manitoba maple growing as a native tree; in fact, from Toronto westward it grows in the river valleys and it does not lie down. It grows up straight and it is a fine tree. Inside the city limits of Chatham you will find Manitoba maples, many of them over two feet in diameter, and you will find them to be straight growing trees. All the crooked-growing trees are the trees that are found in the river valleys west of Manitoba. I do not speak of the Manitoba maple in Manitoba, as I have no information in regard to it, but I do know that they are all crooked west of that. They grow in the river valleys, not on the slopes, as you get west, and the result is that if you look at them you will see that they are just lying down, twisted around and throwing up a trunk here and there. I have no doubt that the seed of these trees is being used. You have this same kind of tree growing on Metcalfe street. It is growing up to be a fine tree right opposite the new building the Government has put up for the accommodation of the Surveyor General's staff. In the Don valley and at Chatham—and I could cite other places as far up as Owen Sound—these trees are growing; but these are two prominent places where the trees are large and growing straight, and I am quite positive that the trees at St. Paul I saw were of the same character. I question whether the trees growing at the Experimental Farm at Brandon are not from the southern side of the line rather than seed from Manitoba and westward. I am only supposing that; I do not know. But, it is a fact that the western trees must be crooked because their fathers are crooked. I never saw a Manitoba maple in that whole western region that grows up straight and beautiful like a tree should. They lie down and are twisted about, and I am positive, sir, that the eastern seed—I will not say eastern, I will say seed nearer the Manitoba border—will grow trees well and you can get all you need.

Mr. Ross.—I may say in connection with collecting seed from the Western States that in the last two springs we have been short in getting this seed, as the maple seed up there has been affected by a fungus and, consequently, we had to get a considerable quantity of seed from St. Paul. It was probably picked in Minnesota. We found that it had the habit of growing straight and that it also had the habit of requiring a longer season to mature, and that when this seed was planted alongside of native-grown seed in the west it took two weeks and, sometimes, three weeks longer for the plant to mature and, consequently, when the frost came on in the fall the plants were killed back almost to the ground. At the Experimental Farm at Indian Head, when they started

FARM IN THE VIRDEN DISTRICT, SURROUNDED BY A WIND BREAK OF BOX ELDER, ABOUT SEVEN YEARS OLD WHEN THE PHOTOGRAPH WAS TAKEN. BEFORE PLANTING THIS WAS OPEN PRAIRIE.

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planting there, they set out some of these Minnesota trees from seed and they were not successful at first on that account, but now they are making very good trees. However, we cannot see any difference as regards their habit of growth from the seed grown from native stock.

Prof. MACOUN.—I suppose I may be permitted, when we have heard the other paper that is to be read, to say something in regard to the points which have been brought out in this one, because this should not be let go without some more discussion upon it.

The CHAIRMAN.—Yes.

Mr. STEWART.—The two papers are somewhat alike and I think they very properly could be discussed together.

Mr. W. T. MACOUN was called upon to read a paper on The Growth of the Forest Trees in the Forest Belts and Arboretum of the Experimental Farm, Ottawa.

The Growth of Forest Trees in the Forest Belts and Arboretum at the Central Experimental Farm, Ottawa.

W. T. MACOUN, CURATOR OF THE ARBORETUM, CENTRAL EXPERIMENTAL FARM, OTTAWA.

Mr. Chairman and Gentlemen,—The first planting of forest trees was made at the Experimental Farm, 1887—some 15 years ago. I have been fortunate, I think, in being connected with the Experimental Farm since that year and in having been connected also with the planting of trees since that year, so that I have grown up with the trees and have been able to examine them very carefully and compare the rates of growth of the different species. I remember quite well in the autumn of 1887 when we were making a part of the plantation in the forest belt at the experimental farm ; it was in the month of November. In the year 1887 we were not as well equipped on the farm as we are now and we had to plant at almost every season of the year whenever there was a chance to do so. There was a gang of us planting out trees in the forest belt in November and there came up a heavy snow storm and we were in this snow storm planting the trees. This tree I have brought with me (referring to a specimen Scotch pine—*Pinus Sylvestris*—on exhibition in the council chamber) is one of the same stock that we used at that time, although not from the same plantation.

Experiments in the growing of forest trees at the Central Experimental Farm were begun mainly for the purpose of gaining information which would be useful to the farmers of Canada, and the fifteen years' work accomplished has been of some service to the farming community, and also to others who are interested in the growth and development of trees from a more economic and scientific standpoint.

About twenty-one acres of the Experimental Farm have been devoted to the planting of forest trees in belts and clumps, and sixty-five additional acres have been used for an arboretum and botanic garden in which forest trees are planted as individual specimens.

The forest belts extend along the whole northern and western boundaries of the farm, the belt along the western side being 165 feet wide, and that on the northern boundary 65 feet, their total length being nearly 1¾ miles. There is an evergreen plantation also occupying about two acres. These belts and plantation were planned by Dr. Wm. Saunders, the director, and the first planting was done in the year 1887.

The main points on which information was desired were :—1st. As to the rate of growth of the best timber trees when grown on different kinds of soil and at different distances apart ; the distances chosen at first being 5 x 5 feet, 5 x 10 feet, and 10 x 10

feet. 2nd. It was desirable to know how the growth of trees planted in blocks of one species compared with those grown in mixed plantations. 3rd. It was important to learn what influence the forest belts would have on the crops in the adjoining fields, in regard to the shelter afforded them, and also how far from the belt the crop would be affected adversely. 4th. The planting was also planned as far as possible with the object of improving the landscape, and the several species were arranged so that a good effect would be produced. Other useful and interesting facts would also be obtained and the belts would stand as object lessons to farmers who saw them and would be useful to those who were interested in studying tree growth.

These were the principal objects in view in establishing the forest plantations at the Central Experimental Farm. We propose to endeavour to show how far these objects have been accomplished. First, with regard to the comparative growth of trees when planted on different kinds of soil and at different distances apart.

The soil in which the trees were planted was in some instances poor, in some cases wet and cold, in others heavy clay loam, black muck, sandy loam and also in gravelly soil. A great variety of soil being represented in the $1\frac{3}{4}$ miles of forest belts.

The black walnut thrives well and grows rapidly on warm sandy loam, but is almost at a standstill in wet, cold, sandy soil, and the trees are stunted and practically useless. This is very interesting, for in western Ontario this tree thrives best in river bottoms, but it is a good example of how trees taken from a comparatively warm and dry part of the country must be given a warm soil in a colder climate even though there is less moisture in the ground. A number of species of Canadian trees as they reach their northern limits are found growing on much higher altitudes than where they grow to perfection. The hard maple is an example. This tree as it grows north seeks the hillsides. In the Maritime Provinces also it is found on the high elevations. The white, red and green ash grow almost equally well on wet, cold soil, heavy clay loam, black muck and gravelly soil. The black ash only succeeds where there is an abundant supply of water.

White, canoe and yellow birches all thrive on the light soils, but they also do well on heavier and wetter ground.

The hard maple succeeds best and grows quickest in warm sandy loam. In clay loam it makes a healthy but slow growth, the growth lessening as the loam gets stiffer. Good drainage is very essential for the vigorous growth of this tree. The red maple does best in moist ground and the rate of growth is largely governed by the amount of moisture in the soil. It is unfortunate that so many of these trees have been planted along the streets of Ottawa, as the permanent roadways and walks which are being made in the city prevent these trees getting the moisture which they require and they are gradually sickening and dying. The red maple has a wide range from north to south in America, and it has been found at the Experimental Farm that trees of this species imported from the south are in some cases not hardy. The silver maple thrives in a greater variety of soils than the red and is a more rapid grower. It, however, also requires a plentiful supply of moisture to make its best growth.

The white or American elm has been tested at the Experimental Farm in a great many kinds of soil. There is an elm avenue about three-quarters of a mile long, and by driving along this the rate of growth of the trees on different kinds of soil can easily be noticed. This tree is making the strongest growth in the warmer but fairly moist soils. Where the subsoil is a cold, compact sand it does not thrive nearly so well. The elm makes remarkably rapid growth where the conditions are favourable. Avenue trees planted in 1888 when about 11 feet high and $1\frac{1}{2}$ inches in diameter 4 feet 6 inches from the ground, are now 37 feet in height and $12\frac{1}{2}$ inches in diameter at the same height from the ground. The red and rock elm have also been tested in the forest belts, but these are not important timber trees.

The beech does best in warm, sandy loam here like the hard maple, but does very poorly where the soil is wet.

The basswood is one of the noblest trees and thrives well in the Ottawa district. It succeeds best in rich, warm soil and seems to require a fair amount of moisture. It has not done so well on light, sandy land. The butternut also grows well here, but does best in warm, rich ground.

Poplars and large growing willows have made very rapid growth on most soils, but on stiff clay loam the willows have made least growth, though the poplars do well in it. The Russian poplars made strong growth at first, but of late years have been affected with a dry rot which is gradually destroying them. The white poplar is very subject to borers, and the aspen is too small a tree to be of much value. The two species which are making the best growth and the finest trees are the cottonwood *(Populus deltoidea, P. monilifera)* and the balsam poplar *(Populus balsamifera)*. These are fine species and reach noble proportions here.

The white spruce makes the most rapid growth on warm, sandy loam soil at Ottawa and the poorest growth in cold, light, sandy loam soil. It does well on gravelly soil and fairly well on clay loam. The Norway spruce, which is the fastest growing spruce we have, makes its greatest growth in good, sandy loam. It also succeeds well on gravelly soil and clay loam; in fact it has made good growth in all kinds of soil in which it has been tested, but makes the poorest growth in the lightest, sandy loam soils.

The American arbor vitæ thrives in almost all kinds of soil. It is most at home, however, on the black and moist ones. It makes the least growth in heavy clay.

There is no forest tree which appears to succeed as well in such a great diversity of soils as the Scotch pine *(Pinus sylvestris)*. This tree makes strong growth in cold, poor soil, in clay loam and in warm sandy loam; in fact we have not discovered a soil at the Experimental Farm in which it does not thrive. The white pine succeeds best in sandy loam, and although it makes a healthy growth on heavier and moister soils its growth is much less.

One of the most striking trees at the Experimental Farm is the European larch *(Larix europæa)*. Like the other European trees, the Scotch pine and the Norway spruce, the larch succeeds almost equally well on all kinds of soil. A block of these trees in the forest belt in cold, sandy, loam soil have made very satisfactory growth, while equally if not better growth has been made on the highest sandy loam on the farm. The trees have also made strong growth on heavy clay loam. The larch saw-fly is, however, very troublesome and if the trees were not sprayed they would be defoliated every year. It is a remarkable fact that in the arboretum where specimens of the European larch and our native tamarack are grown within a few feet of one another the saw-fly has not attacked the native species. Tamarack transplanted from a swamp adjoining the Experimental Farm have surprised us by succeeding admirably on the higher ground in sandy loam soil. Whether the tree will reach a large size in this soil has not yet, of course, been determined. The success of this tree on the higher ground may be explained by the fact that much of the soil at the Experimental Farm is underlaid with a moist subsoil.

A tree which, although not of any importance as a timber tree in the east, is of great value in Manitoba and the North-west, is the box elder *(Acer negundo)*. In the west this species makes a fine avenue tree, having a straight trunk and symmetrical top, but at Ottawa the trunk is usually very crooked and the tree unsatisfactory except that it makes a very rapid growth and is useful for temporary purposes. The box elder has been used freely in the newer plantations as a temporary tree for shading the ground. Planted in blocks it has not done well. The tree requires plenty of light and fails when crowded. The box elder succeeds on most soils, but does best at Ottawa in the lighter and warmer loams.

As already stated, the trees in the forest belt were planted 5 x 5 feet, 5 x 10 feet and 10 x 10 feet apart in order to learn which was the most satisfactory method. These distances have all been found too wide. Where the trees were 10 x 10 feet apart cultivation was still necessary in some cases eight years after planting, in order to prevent sod from forming, and to get the trees to make satisfactory growth. The lower limbs of the trees planted 10 x 10 feet apart have in many cases not yet died, the result being that the trees have knotty trunks. The tops of the trees planted 10 x 10 feet apart have also been more broken by storms than those planted closer. The main objection, however, to such wide planting is in having to keep the ground cultivated for so many years.

Even 5 x 5 feet has not been found an economical distance, as cultivation had to be kept up for from five to seven years, depending on the species and the arrangement of the trees.. The most satisfactory growth from a forestry standpoint has been obtained in a solid plantation of evergreens, which was in 1887 a nursery, but which was allowed to remain and was extended. The trees in this plantation were in rows 3 feet apart and the trees from 1 to 2 feet apart in the rows. These have done remarkably well, growing tall and straight, and having their lower branches killed early owing to the dense growth. This plantation has been gradually thinned until the trees are now about 3 x 4 feet apart, but the distance will be widened somewhat this year, as more will be taken out for poles.

During the past three years some new plantations have been made in the forest belts where certain kinds of trees have failed, and the trees in these blocks were planted only 2½ x 2½ feet apart. These were not really all timber trees, as a large proportion of shrubs and small trees were used for the purpose of shading the ground and saving cultivation. Several kinds of trees and shrubs were used for this temporary purpose, with the object of finding out which were the best. It may be found that 2½ x 2½ feet apart is an extreme in close planting, and that a slightly wider distance would be more satisfactory.

It has already been said that the trees in the forest belts were planted in blocks of a single species and mixed plantations in order to demonstrate which was the better plan.

The rapid growing evergreens have succeeded about as well in unmixed blocks as where mixed with deciduous trees and other species of evergreens, but the deciduous trees have required much less labour to keep them growing vigorously where the species have been mixed. For instance, the ash, walnut, butternut and elm, though rapid growing trees, have thin foliage and in the case of the ash, walnut and butternut are late to leaf out in the spring. The result is that there is greater opportunity for grass to grow; there is also greater evaporation from the soil as the leaves are not thick enough to shade the ground thoroughly. The result is that the trees do not grow as rapidly as if there were no sod and the ground well shaded.

The hard maple, oak and beech are rather slow growing trees, and although they have heavy foliage do not grow rapidly enough when planted in rows and cultivated to shade the ground in a reasonable time.

The quick growing but thin foliaged trees require the thick foliaged deciduous kinds and the evergreens planted among them to make good soil conditions and give best results, and the thick foliaged but slower growing kinds require the others for the same purpose. The box elder is both a thick foliaged and rapid growing species, and hence a very useful kind as a temporary tree.

There is another advantage in having a mixed plantation on a farm, and that is that injurious insects spread less rapidly and are easier controlled than where the trees are in blocks of a single species.

A number of average trees were selected in 1893 in the forest belts which showed the following results:—

Name.	Distance apart.	When Planted.	Height when Planted.	Soil.	Height, 1902.	Diameter 4 ft. 6 in. from Ground, 1902.
	Feet.		Inches.		Ft. In.	
White Pine.....	5 x 5	1889	8–10	Light sandy loam with gravel..	25 3	3½
"	10 x 10	1889	8–10	" " ..	24 5	5½
Scotch Pine....	5 x 5	1887 Fall.	18	Low sandy loam with gravel...	27 7	4⅜
"	10 x 10	1887	18	" " ..	22 9	5
"	1½ x 3	1887	9	Light sandy loam and gravel...	26 4	3½
Black Walnut..	5 x 10	1887	12	Clay loam	17 8	3½
White Ash	5 x 5	1889	3-year.	Black muck	25 7	2⅝
"	10 x 10	1889	"	Light sandy loam, moist bottom	26 9	3½

We have no actual information regarding the beneficial effects of the forest belts at the Central Experimental Farm on the crops growing in their vicinity, but at Indian Head, N.W.T., it has been found that the crops have been increased very much. The snow is more evenly distributed in fields protected by forest belts, and in the North-west especially it is prevented to a large extent from blowing away altogether. The evaporation of moisture from a field protected by a windbrake is also less than where it is unprotected, and hence there is more moisture available for the growing crop. The crops are affected adversely by the windbreak for a short distance, as the roots of the trees extend into the field for some feet and moisture and plant food are taken from the soil at the expense of the grain or root crop, but this small loss is offset many times over by the protection afforded.

Arboretum.

There had been no successful attempt made to establish a national Arboretum and Botanic Garden in Canada previous to 1886, but when the Dominion Experimental Farms were organized in that year, sixty-five acres were reserved at the Central Farm for this purpose. The site chosen was a very suitable one as most of the land is high and a good view is obtained of the city of Ottawa in the distance. The Aboretum has developed very rapidly, as although the first planting was done in 1889 there is now a collection of trees, shrubs, and herbaceous plants which as regards the number of species and varieties represented will compare very favourably with some of the older established Arboretums and Botanic Gardens. In the autumn of 1902 there were about 2,900 species and varieties of trees and shrubs growing there although about 3,800 have been tested. There is also a large collection of herbaceous perennials. In 1899 a catalogue of the trees and shrubs which had been tested up to that time was published by Dr. Saunders and the writer.

To give an idea of how many species and varieties of some of the principal trees are being tested, it may be mentioned that there are 110 species and varieties of maples, 100 of oaks, 92 of ash, 89 of elms, 66 of spruce, and many of pines.

Canadian trees and shrubs have been thoroughly tested and are well represented. All of the known species of Canadian trees have been tested with the exception of a few Western and mostly Rocky Mountain kinds. There are six species which kill out root and branch, namely, *Acer macrophyllum*, *Arbutus Menziesii*, *Cornus Nuttallii*, *Quercus garryana*, all of which are natives of British Columbia and the western coast, and the Papaw, *Asimina triloba* and the *Sassafras officinalis* from South-western Ontario. The Button-wood, *Platanus occidentalis*, Sweet Chesnut, *Castanea sativa var. americana*, Blue Ash, *Fraxinus quadrangulata*, and Honey Locust, *Gleditschia triacanthos*, cannot be regarded as perfectly hardy, as some specimens kill back, but others are hardy to the tip and make good annual growth. Practically all the rest of the Canadian trees are quite hardy at Ottawa.

Of the 121 species of Canadian trees given by Prof. John Macoun, in his paper on 'The Forests of Canada and their Distribution,' about 100 have proven hardy or half hardy, and when all have been thoroughly tested there will probably be not more than 10 which cannot be grown. Most of the mountain species succeed here. The Douglas fir, *Pseudotsuga Douglasii*, that magnificent Western tree, thrives well in the Arboretum, as does also the Bull Pine, *Pinus ponderosa*, another British Columbia evergreen. Engelmann's Spruce also makes thrifty growth.

Mr. MACOUN displayed a number of photographs showing the progress that has been made in tree culture at the Experimental Farm.

He also called attention to the pine tree on exhibition which in a plantation 1 x 3 feet apart had made a growth of 26 feet in 17 years.

The CHAIRMAN—Mr. Macoun's remarks on the growth of forest trees should prove to be of great value to those undertaking the planting of forest trees. I think the paper is a most valuable one.

Mr. STEWART—The Association feel very much indebted to Mr. Macoun for the great trouble he has taken in the preparation of his paper, and I am sure that this will be one of the most valuable papers the report will contain.

Dr. SAUNDERS—Mr. Macoun referred to me for some particulars in regard to the protecting influence of the wood belt, or forest growths, on our North West plains. We have, as most of you are aware, been carrying on this forestry work for fifteen years and we have now planted on the Experimental Farm at Indian Head over 120,000 trees and about 75,000 on the Experimental Farm at Brandon. These were planted in very many different ways so as to test the best methods of growing them. Besides that we have distributed among the farmers about 1,500,000 of young trees and have sent out 9 tons of tree seeds in 1 lb. packages, so that as the result of this work you find these small plantations of trees all through the north-west, the result of the work of the Experimental Farms. I happened to be passing Indian Head some three years ago in the spring after a very violent storm. Mr. McKay, the superintendent, and I went over the ground and we found the protective influence of the forest growth on the plains there was about 50 feet for every foot in height that the shelter belt grew ; that is to say, a shelter belt 10 feet high protected about 500 feet wide of field. We had a field of barley that was sown alongside of one of the belts and other fields of grain at other points. The protective influence of the belt was very marked. The storm had been a very violent one and the trees were about 30 feet high and for 750 feet out the grain was green and well protected and in good condition while beyond that it began to get thinner and thinner and for a few feet it was entirely obliterated. There the whole crop was wiped out by the force of the wind blowing the plants out of the ground. We measured this at several points and we found that for each foot of growth there was about 50 feet of protection. I referred to this in our next annual report but this is a thing that I think should be widely known—the great advantage that tree growth is on the north-west plains in affording protection to the ordinary field crops of the country.

The CHAIRMAN—Is there any gentleman who would like to ask any questions or make any remarks in regard to this very valuable paper?

Prof. MACOUN—What is the difference in growth between red and Scotch pine?

Mr. W. T. MACOUN.—We have no large plantation of red pine at the Farm. They were not used very largely in the belt at the beginning because red pine trees were not as easily obtainable as Scotch and white pine. We have however planted specimens on the farm and the tree does not appear to grow quite as rapidly as the Scotch pine though it grows almost as rapidly.

Mr. KNECHTEL.—I have been intensely interested in these papers and I am very glad to know that the work of planting shelter belts in the North-west has been attended with such satisfactory results. I remember travelling through Manitoba and the North-west Territories a few years ago before this planting had begun. I was at the Experimental Farm at Indian Head and visited also the Experimental Farm at

Brandon. Now, when I was at Indian Head Mr. McKay showed me where he had planted some seeds in front of his house and then he took me round the pond and he showed me where the seeds had begun to grow on the other side of the pond. The wind had blown the seeds out and had carried them across the pond.

I was at the hotel in Regina. Major Bell came down there one morning and he said to the hotel keeper: 'I have some more land.' 'Well,' the hotel keeper said, 'I should think that a man with 4,000 acres had enough.' Major Bell said: 'I could not help getting this land because there was a high wind last night and it blew the Experimental Farm over to my property.' The hotel keeper said: 'Are you going to keep it?' 'No,' replied Major Bell; 'the wind may change to-night and blow it all back.'

I was very much interested in Mr. Macoun's paper more particularly because we have made a large plantation in the Adirondack mountains. Last spring we planted half a million trees and consequently we are very anxious to know how these trees are going to turn out. It is an experiment that is of great importance not only to our state but to other states. I was interested and pleased to have this matter of dense planting brought out so clearly and so fully. It occurred to me that there were one or two points that Mr. Macoun did not touch upon although probably he knows all about them. Some trees send their roots deep and some trees are very shallow rooted. Take for instance the red spruce in the Adirondacks and it grows very shallow. If you were to cut away the hard woods very short, as was shown in the experiment, the wind would very likely blow the spruce over since it is so shallow-rooted. White pine sends its roots rather deeply. This has been my observation and I believe it is the observation of most writers. So, you have by planting thickly economy of space, and secondly, economy of moisture and soil. Then the trees grow differently, as has been brought out in this paper. They differ in their height. White pine excels the spruce in its height growth. Consequently by planting thickly you have an economy of air, space and light. Light, as you all know, is one of the essentials of tree growth; the tree cannot do without it. There is a point, however, I should like to emphasize in regard to this matter of planting densely, and that is the advantage resulting from the mixing of species. In our plantation in the Adirondacks we have mixed the species generally; we have mixed the spruce with the white pine and we have mixed the spruce with the tamarack. We have made some plantations of pure stands for experimental purposes. Our idea in planting white pine mixed with spruce is this: I have observed, and no doubt many of the gentlemen here who are observers of trees have noticed, that the white pine, when grown in pure stand, does not clear itself of the lower branches. I may say this is quite true no matter how thickly they grow. I have in mind the growths in the Catskill mountains and in the Adirondack mountains where white pine stands as thickly as it can stand. You cannot make your way through it without a great deal of difficulty. In these groves the lower limbs of the white pine have died, being excluded from the light. The dead branches are still there and they are interwoven so that it is very difficult to make your way through the growth. By planting the spruce and the white pine the idea is this: the white pine is a more rapid grower than the spruce. By the way, we planted these trees about 5 feet apart each way. The lower branches of the pine as they die will be knocked off by the more slowly growing spruce. I think you will be led to the same conclusion as I have been if you will observe the big pine of the forest. These great pines, 150 feet high, clean of

branches, 80, 90 or 100 feet high, are not grown in pure stand, but they are grown with hemlock and hardwoods. I have been very much pleased to know that the Douglas fir does so well with you. We have planted some of the Douglas fir on the slope 4 feet apart. We have mixed it also with white pine and we are very anxious to know how that experiment will result. I might go on and tell you some things about the manner in which these trees are seeded in the forest and left to themselves, but as I understand that would be a little bit foreign to the subject immediately under discussion, I shall close.

Mr. Ross—I would like to ask Mr. Knechtel, what method they follow in planting small trees?

Mr. KNECHTEL—I might state, here, in preface to my remarks concerning that subject, that we have a proposal from the United States Bureau of Forestry to this effect; you will remember from reading the reports that the Bureau of Forestry was employed by the Forest, Fish and Game Commission two years ago to examine the timber in township 40 in the Adirondack mountains and to make certain recommendations with a view of keeping there a perpetual forest of the desirable species for use in the mountains, especially such as white pine and spruce. Their recommendations were that the Commission cut out the soft woods to a diameter limit of 12 inches, leaving the hardwoods and seed trees of the soft wooded species, and it was thought by them that these trees would seed themselves in the forest and that as the older growth was removed there would be the young growth to take its place. Dr. Fernow went at the problem in rather a different way. He had received from the Legislature of our state a tract of 30,000 acres of land on which he was to show the different methods of treating the forest. On a certain piece of that land that I have in mind now, he cut out the woods, leaving only a few trees as shade trees and he left the soft wood trees. The wind came in and blew down the soft wood trees, and therefore it is a problem to know what to do with the forest. I may say that I am of the opinion that the soft wood trees, if left to themselves, will not re-seed themselves sufficiently to keep up the forest perpetually, and if necessary I can give my reasons for that statement. I put in a month in the forest and was in the forest every day of the week studying that particular question, and that was my conclusion at the close of my work. Now, the Commission has under its charge the state lands of the Adirondack mountains. There is a large area that was burnt over and some of this is almost clean of timber. It was such a tract that we planted last spring. The fire had swept over there time and again and it cleared a large area of, I may say, all the timber, although there are a few logs and stumps here and there. The humus has gone entirely and nothing but the mineral soil left there. We got out plants from Dr. Fernow. They came to us in wagons. Our plantation is about 12 to 14 miles from the nurseries of the College of Forestry. We advertised for men stating that we wanted 60 or 70 men to help us to plant trees. We got a force of about 60 men. I had charge of the plantation myself; consequently, I presume, I have authority to speak on the matter. We divided the men into three squads, and for each squad we appointed a foreman. That left my hands free to attend to this, that and the other thing. I was not tied up with details. In planting we took strips back and forth across the plain. The strips were 150 paces across; that is, supposing this desk to be the plain here, we started at this end and went in this direction. Now, across there the distance is 150 paces. Half of the men had grub hoes, the other half had pails with plants; then, we had men

FOREST BELT—BLACK WALNUT. CENTRAL EXPERIMENTAL FARM. [p. 72]

to carry plants to these planters, keeping the pails supplied with plants constantly and we also had water carriers. Now I gave you the width of the strip as 150 paces. We found that a longer width would not give us such good results as the men liked to see the end of the row soon because we give them a chance to sit down at each end of the row. Going across the field we give them three minutes, and when they came back we gave them five minutes and they got a drink—of water. The man with the grub hoe dug a hole, the man with the pail came behind and put in his plant, put the soil carefully around it with his hand and then tramped it down with his feet. The plants were kept puddled; the water carriers were required to keep water and soft mud in the bottoms of the pails so that the plants were kept constantly moist, and we did not allow the roots to get dry at all. We found that on the average two men could plant about 1,600 trees a day. The Legislature gave us $4,000 for the work, and with that $4,000 we made a nursery in the Catskill mountains for a million seedlings, we made our plantation at Saranac lake, and we have money left to make a nursery in the spring in the Adirondack mountains. We put in half a million trees at a cost of $2,500, or about half a cent a tree. I do not know that I can add anything to this. If any gentleman has any question to ask I shall be only too pleased to answer it if I can.

Mr. Ross—What percentage of trees is living?

Mr. KNECHTEL—Last fall there was a committee sent from the Legislature to examine the plantation and make a report. They were very highly pleased at the way the trees were living. It is hard to get an estimate of such a large plantation, but you can hardly find dead trees. They seen to nearly all have lived.

Mr. STEWART—Through the winter?

Mr. KNECHTEL—I do not know about through the winter. Of course, next spring we shall be able to observe that. I may say in regard to the plantation we made in the Catskill mountains the year before that we planted about 5,000 trees up the mountain side with a grove at the top and a grove at the bottom and then four lines of trees connecting these two groves. Last June I went down there to examine these trees. I made an actual count. I went up between the rows and when I saw a dead tree I put down a dot on one side of my note book, and when I saw a live tree I put down a dot on another side of the book. By this actual count I found that 97 and a fraction per cent of the spruce were alive, that over 80 per cent of the white pine were alive, and that 95 per cent of the Scotch pine were alive.

Mr. STEWART—How long after planting?

Mr. KNECHTEL—They were planted in the fall of the year, about the 1st of October, and it was the 10th of June that I made my examination.

Mr. STEWART—They had gone through the winter?

Mr. KNECHTEL—Yes, and I made measurements also. I measured 100 trees at the foot of the mountain to ascertain the growth they had made during the spring. I measured 100 at the top of the mountain and 100 of each species down the side. I found the average growth of the Scotch pine was the greatest. If I remember rightly it was some 9 inches. However, this is rather a cold place, the spring did not open

very early, and there had not been a great deal of time for the trees to grow. After they had been planted in the fall there could not be any growth, and it was on the 10th June I made my examination.

Col. D. McRae, Guelph, Ont.—Mr. Chairman, I represent the farming part of the business, and I may say that I have had a little experience in tree planting and a good many disappointments possibly because I did not know how to go about it. The trouble, sir, from the farmer's standpoint is, that we do not cultivate the land when we plant trees. There are two places where we try to grow trees occasionally, and these are the rough pieces of ground that we cannot do anything else with and along our fences and roads. In neither case do we care very much to cultivate the land, and the trouble very largely is that there is too much grass, which, we find, perhaps in the first or second or third year, is apt to kill the trees. I have been very much pleased with the paper I have heard read by Mr. Macoun, and I have derived considerable information from it. I too, sir, have found that the Scotch pine is a very good growing tree. My conditions are very much those that he said are best adapted to the growth of some of the evergreens—I mean sandy loam. I have been planting on sandy loam with a deep sandy sub-soil. Norway spruce I find grows very well if planted rather thick in rows. A year or two ago my trees were attacked by some disease—I dare say some of you gentlemen know it very well—resulting in the leaves falling off. I removed the dead trees, but I have still enough left to make a very nice shelter now 30 feet high along one corner of the farm. I find the white pine doing very well and growing more rapidly than Scotch pine. I think we ought to encourage more of our farmers to grow the evergreens if we can manage it. I would like from the professor some experiments along the line of keeping down the grass without working the ground. I have been trying, with partial success, mulching. It is very much easier to do a little mulching than it is to work the ground, and as we cannot always expect to be able to work the land in which we plant trees, I would like some lessons along this line I am speaking about; that is the line of keeping down the grass and keeping the trees alive without stirring the ground. There is another point that I would like to mention and it is in regard to removing the dead branches. I wonder if it would pay in a plantation on rough ground to go in whenever the branches are dead and remove them. I come from a part of the country where they grow some very beautiful pine. I can remember, when a boy at school, a stump so large that a six-foot man could not put his fingers and toes over the two sides of it. I can remember seeing twelve twelve-foot logs taken out of a white pine tree before you touched a branch. I can remember a saw mill in the neighbourhod which for 15 years had a piece of white pine no less than 6 inches thick, frequently 12, and too wide to go between the stakes of a wagon. There must have been some very good results in getting out the branches in the early days. I can remember that the timber never had the heart of the tree anywhere near the middle, but very much at one side, which is a matter that is perhaps worth noticing. In trying other trees besides the evergreens I found fairly good results from the walnut, even growing it from the nut. At Guelph we are about 1,100 feet above Lake Ontario—the agricultural college is 1,190 feet above the lake—and we are quite north and very much higher than the old line of walnut which we used to think was the line of the old Great Western Railway from Hamilton to London, but I find that walnuts do fairly well. I have never been able to do anything with the hickory. Then, we have the elm, but we are troubled with the borer, and I find that is one of the troubles in growing that tree. However, I should like some

experiments along the line of planting trees on ground which cannot be cultivated and along the fence lines. I understand that in many parts of the continent they are planting along the roadways fruit trees with very good results, and I should like experiments along that line, also as to what varieties of trees are best to cultivate along the road sides. I have been very much pleased to hear what I have heard here to-day and very much benefitted.

Mr. W. T. MACOUN.—If Col. McRae has noticed some of the photographs that I have brought, he will have seen some plantations we have established with trees planted 2½ feet apart each way. The object was to get the trees shaded as rapidly as possible so as to kill out the grass. A very large proportion of them are really shrubs. We have used several native shrubs for this purpose. There is one in particular that does very well, a strong growing spirea (*Spirea opulifolia*) which is found near streams. It is a heavy foliage shrub and by planting this among the trees it shades the ground very early. Then, we have used the box elder which grows quickly also. It may be necessary on a farm plantation to keep the box elder chopped back so as not to crowd out other trees. There is a great opportunity for the Department of Forestry of Ontario to take up the work in that province, of determining the best methods of growing trees on rough farm lands. We cannot do that very well on the Experimental Farm here, as there is no provision yet, but it will be a good line of work for the Department of Forestry in Ontario to take up. If I had a farm of rough land and wished to make a plantation of this kind, I should get good nursery trees for the permanent trees—either grown by myself in beds, or bought—and plant these three feet apart each way, and then fill up with young trees from the woods—anything I could get—and make this a thick plantation even if the trees were only a foot apart, and then I could easily control these trees in the autumn or the winter, cutting out what I did not want to grow.

Col. MCRAE.—What would you suggest for evergreens? Would it pay to remove them as soon as they die?

Mr. W. T. MACOUN.—The only advantage in removing them is to obviate the danger from fire, and also to enable light to get through the plantation easily. Of course there is always great danger from fire where there is a lot of dead wood.

Col. MCRAE.—You would cut them at once and remove them from the ground?

Mr. W. T. MACOUN.—Yes, if it were found economical to do so. There is great danger of fire. In the plantation at the farm we have a large stock of evergreens. During recent years a great many houses have gone up close to the farm, and people come in, and there is danger from fire. Last year I had all the dead wood cleaned out as I thought the danger from fire would be much less.

Mr. ROBINSON.—In regard to breaking off the dry limbs, if they are broken off as they become dry, would it not have a beneficial effect in rendering the future growth clear of knots. We find that the value of white pine varies very much in relation to its freedom from knots or the reverse, because, as you know, in one piece of pine you may have different grades from first quality to fourth quality. The fourth quality is full of knots and the first quality goes up 200, 300 or 400 per cent in value. If these

branches were cleared off as soon as they become dry, would it be better in future for the growth of that pine, than to allow them to remain and let nature take its course?

Mr. W. T. MACOUN.—I think you will find, Mr. Robinson, that the new growth takes place between the dead branch and the wood. When the branch becomes dead the tree does not grow over it. Division takes place and the dead part is separated from the living wood. I have not gone into the question very thoroughly. Perhaps Mr. Ross has studied that part of the question.

Mr. ROBINSON.—Lumbermen have had the idea that a knot in the course of time gradually absorbs and gets away. We sometimes see a place where we might suppose a knot had existed as the timber is soft around it, and in other cases we find a small sized knot near the heart of the tree.

The CHAIRMAN.—If a dead branch breaks off four or five inches from the tree and the tree goes on growing it will be found to have one of these pin knots. That is one of the reasons why I think if we could cut off dead branches as close as possible to the trunk we would have more good timber and more clear timber. Mr. Joly has had considerable experience in pruning trees and he might tell us something about it.

Mr. JOLY DE LOTBINIÈRE.—I am sure that my experience will be nothing compared, with that of the professor and the practical experts who sit beside him. My impression, whether right or wrong, in so far as coniferous trees are concerned is that it is best always to trim off the lower branches as soon as I can. I am aware that when planted in groves and so on the lower branches will die as the heads come together and nature will do the trimming, but all the same I was under the impression—I think I am yet—that the centre of the branch is practically in the heart of the tree. In all coniferous trees the branches start from the heart. That dead branch is foreign matter to the tree. The tree has to continue growing, and I think as long as that branch remains the tree continues in its annual growth to envelop that branch. It makes a knot that is going to remain in the timber so much longer. If it is a big branch it may hold it for five or ten years and you will have a much larger knot in your timber. Therefore, the method I pursue in dealing with these trees is always to prune coniferous trees as soon as I can to the height I wish.

The CHAIRMAN.—Would you prune as close to the sap wood as if it were a hardwood tree?

Mr. JOLY DE LOTBINIÈRE.—Yes, sir, just as close as I could.

The CHAIRMAN.—I know that your father insisted that the closer you pruned to the sap wood the safer it was.

Mr. JOLY DE LOTBINIÈRE.—In treating hardwoods when grown in groves, I think that once the heads come in contact and the branches begin to die from loss of light, and so on, it is just as well to let nature do her own trimming. The branch gradually dies off and at a given moment becomes like powder almost near the tree. Nature's trimming is very often better than any trimming we can do ourselves for the hardwood.

Mr. Ross.—I would like to say a word in connection with the pruning of trees. I think in this case it is entirely a question of finance. You must remember that when these trees are young they are comparatively close together, being at the rate of 5,000 to the acre and there is a very small percentage of these trees that will ultimately become trees thick enough for timber. Then the question of expense would come in, pruning these trees. When I had the opportunity of going through some of the forests in Germany, especially the Scotch pine forests, in one district I found it was their practice to go through the Scotch pine plantations of about 20 years of age and pick out so many trees to grow—probably 100 or 200 trees—which from their form were bound to become the best trees for timber later on. These trees they would prune out as high as they could get at them for the branches; the remaining trees were not so pruned and would have to come out in order to give the trees that were pruned the best chance of growing. This question of the pruning of the trees does not seem to be practical or economical. Probably only 200 trees per acre would be merchantable and these trees might be pruned but I do not think it would pay for the trouble.

The CHAIRMAN.—I would like to ask Dr. Unwin to address a few words to the meeting.

Dr. A. HAROLD UNWIN.—Mr. Chairman. It seems almost presumptuous for me to express an opinion in regard to the question of pruning trees. I may say that there is no doubt that no organic connection takes place between the new wood and where the old branch has been cut off There were some experiments along this line conducted at Freiburg. I may also mention that in the English market they ask particularly whether a tree has been pruned, and if it has been pruned the seller gets a less price than is paid for a tree that has not been pruned.

The CHAIRMAN.—Do they fancy that the gum exuding has anything to do with that?

Dr. UNWIN.—Yes, in coniferous trees—gum trees, that of course is the trouble. In regard to the broad-leaved species, the oaks and the ashes, there, an organic connection is formed.

Mr. ROBINSON.—I simply drew attention to the dead limbs. I did not refer to the green limbs. My question was, whether it would be better to take off the dead limbs as they become dead or allow nature to do this work and let them drop off. I did not speak of the trimming of green limbs. I do not think that would be a right thing.

Mr. KNECHTEL.—I believe if I were a farmer and had a wood lot and found that the trees were not clearing themselves properly I would go in and trim the branches off and I would cut them close to the trunk. And if I had plenty of time I would go around and top those wounds with lead paint. That is the dressing that is recommended by Prof. Bailey of Cornell and he states that it does not make any great difference as to what month you do the pruning in. Bleeding, he thinks, is not to be feared but he would put on the lead paint to exclude the fungi that we heard about last evening.

Prof. MACOUN.—I would like to say a word or two in connection with the growth of pine trees. We have a tree here before us that has been grown where they are crowded together. Those that want timber trees have an object lesson. The thing is plain. If

you want timber trees to do their work properly, the way you want them to do, plant them in a way that will do that, and if you want shade trees you will know what to do, give them space. If you want them for timber trees, crowd them close together, and, as this gentleman has stated in connection with the forests in the old country, they go through, see which are the best and prune them and keep them pruned in order to enable them to make better growth. I think that is sound wisdom. I believe it is the right thing, but this is what struck me more than anything else. That is a Scotch pine (pointing to the tree on exhibition) and we are told that it is one of the best trees that will grow on any ground. Do you see the Scotch character in it? To me it shows that there is a unity between the animals that live in a country and the vegetation that is produced there. At any rate, a Scotchman will thrive anywhere and Mr. Macoun showed that this pine will thrive anywhere; and if it will do that it is invaluable in a country like this. A point in Mr. Macoun's paper that to me is most important is that they have experimented at the Experimental Farm and that they can state definitely the results, and a man is a fool that will go and experiment himself until he tries their experiments. That is the way to look at this matter. I hold that these men at the Experimental Farm either know or they do not know, and we should take their knowledge and use it at the start, and if we find that they are wrong and we are right then we can make a change, but, to begin at the beginning and think we know it all simply because we have views of our own seems a piece of nonsense. There are two things that we want in this country. We want to have the results of these experiments brought out by the gentlemen who read papers before us, and then we want reforestation where it is necessary, such as this gentleman from Guelph spoke of. We want shade trees in many places and we want to know the conditions under which we can grow shade trees. We have had a very good exposition both from the gentlemen who spoke and the gentleman who read the paper. The question to me is why we should allow this information to be given and lost. This gentleman from the United States has shown the way they work there, that when they want to produce a certain result they do the work in a certain way. We do it also, and yet there are men who hear these explanations who will go away and begin on the work in another fashion. Is that right? It is not, and the wise man is the man who goes ahead and picks up information everywhere. Now, about North-west growth, what struck me when Mr. Ross was speaking was this: The Manitoba maple, as we call it, grows in its native state in the river valley where it requires an enormous amount of moisture. We take this tree and plant it as a shade tree or as a standard tree in the country, and mark you, that is the tree which in its native condition requires the most water. It grow an enormous amount of leaves, more than any tree I know of for its size, it grows very rapidly and it holds an enormous amount of water. I do not mean to say that it is wrong to plant this tree, but what I mean to say is that this is the tree of all others that grows in the North-west that requires the most amount of water and yet it is a remarkable fact that it is used most and succeeds best in that western country. What we want to do is to study the nature of the tree and apply its mode of operation to our work. Now, evidently, Mr. Ross has seen that, and in the plantations that are being made they are doing this thing: but to go and put into the country a tree that is an experiment and that has not previously been experimented with, doing the thing as an experiment, is a loss of time, so that as we move in this matter here is the way I can see it. Here is a tree that succeeds well in the country under certain conditions. What are these conditions? Take the elm, for instance, in the Red River valley, in the

valleys that run away up to Fort Pelly, in the Red Deer River valley and up as far as Regina the elm keeps up in the river valleys; that is its home. I have seen the elm higher than this ceiling in the valley of the Qu'Appelle, a little outside of Regina. Therefore, all we have to do is to follow the course of nature in the matter and success is sure. Now, here is an example of what can be done by planting this tree under certain conditions. One word more and I have done. My remark about conifers is that the conifer constantly grows from the point. Set out one in the open, prune out the branches on all sides and every year the branches are lengthened until a shade is formed. To grow conifers separately for any other purpose than for ornamental work is absolute foolishness. For the purpose of growing conifers—I may say pine and spruce specially—we have to grow them closely together, then the lower limbs die and the others keep moving up, and then comes the question of pruning them. I agree with the gentlemen who say cut off the limbs closely. You will have three or four pin knots in the centre of the tree but the rest of the tree will be first-class. Hence, I say not only to prune but to prune closely and then you have all the knots in the centre. I am speaking of conifers of all kinds because they grow in that way. I am speaking of spruce and all such trees, because, if you want to grow them as timber, you must cut them off close because the knots go right into the centre. The branch of the pine comes from the centre. If you look at the top of the tree you will find a bunch of buds. Every one of these buds has its basis in the centre and they form a whorl in years to come, and every one of these is run into the centre and the nearer you get the limb off in that way the better it is for the future of the tree.

Mr. JOLY DE LOTBINIÈRE.—About the pruning of black walnut, and I must confine this to this eastern section of the country, where the people are beginning to take a certain interest in that tree, I said a moment ago that some people had the idea that the time in which the pruning can be done is more or less immaterial during the summer, but I can assure my hearers that as far as black walnut is concerned in Quebec that is not at all the case. The pruning of black walnut here should be done in June, at the very beginning of the summer, so as to give the callus, the wound that is made, an opportunity to form itself thoroughly and to mature. If the pruning is done too late in the summer the callus will form to a certain extent less than if it is done early in the summer, but the callus will not absolutely mature and invariably it will freeze back. I have seen wounds that began with a mere nothing beyond a branch an inch and a half in diameter being pruned at the wrong time; in ten years there was a wound as big as this with a circle marking each yearly growth showing that the callus did not begin to heal, and as the callus got bigger the wound got bigger. If you prune in June and prune closely that difficulty is obviated, and I would like strongly to urge that point on all gentlemen here in respect to black walnut. Prune as early as possible in June and as closely as possible.

Prof. MACOUN.—I have a remark to make that is applicable to our city and I would like the officers of the Association to take the matter up. To-day any one can go up to Theodore street and look at the lovely trees that are up there. A man in connection with the electric light company, or some other company, comes along and cuts the limbs of these trees and destroys them, makes them an object lesson for all time to come to anybody coming to the city. You can go and see that to-day. I would ask, sir, is it not the duty of this Association to aim at the beautifying of our cities as well

as the beautifying of our country districts. Are we going to allow irresponsible men to destroy our shade trees? If I put up shade trees in front of my house and wait for a certain number of years for them to grow, and some ignorant irresponsible men come along, quietly climb up into my trees and cut the tops off in any way it suits them, not to prune them but to destroy them, is there no remedy for it? If there is no remedy then it is our duty as a society to pass a resolution here, send it to the city council and show that we are alive to the beauties of our city and that we are alive to the destruction of the beauties of our city. I am speaking now of Theodore street where the trees have been destroyed within the last two or three weeks by irresponsible men. Nobody says anything about it. How do I know that they will not come to-morrow and cut down some of my trees? I hope the committee on resolutions will draw up a suitable resolution; let us pass it this afternoon and lay it before the city council demanding that this pruning of trees—not the pruning, but the absolute destruction of trees—shall be stopped. I am speaking of this particular case now, I could show a hundred similar cases, it is going on all the time, and we say nothing about it.

MR. JOHNSON.—I think there is a law in connection with this and it is that every person undertaking to prune these trees, or destroy them as the case may be, must have authority from the city council, so that it is not the irresponsible individual who is cutting them down but it is the householder who is to blame if he does not apply to the city council to obtain a stay of proceedings if he believes that his trees are going to be destroyed. I made some inquiry in respect to the cutting of trees on Daly avenue where they have absolutely destroyed them. They had not even the grace to take the twigs away but they left them on the street for the next snow storm to cover them up, and they are there and will be there in the spring. I found that there was a certain amount of remedy, but certainly I agree with Prof. Macoun that we ought, as a society, to pass a very strong protest so that we can put a little backbone into the city council. There is where we have to put the pressure.

Col. MCRAE.—I know of a case that occurred a short time ago. Only two weeks ago I was visiting a friend in Fort Rouge, a suburb of Winnipeg, and he showed me some trees that had been pruned by men under the direction of officers of the city council. When these men began the work my friend's wife telephoned him and he came home very angry and got them stopped. He then sued the City of Winnipeg and got a verdict. The council carried it to the Court of Appeal, but the householder won and it cost the City of Winnipeg several hundred dollars for the pruning of three trees.

Prof. MACOUN.—If the city council are a set of ignoramuses it is our place to teach them their duty and to enlighten them in the matter. I am not going to plant trees and wait for 20 years to see them come to something and then have a fool from the City Hall coming and cutting these trees down. As you know, we do not put our best men in the city council; we usually put the men there who want to go.

Mr. ROBINSON.—If any of the gentlemen here are interested in the growth of pine, I might mention that there are two blocks which I have placed on the desk showing the growth of pine in a locality not far from the city of Ottawa. The growth shown there has taken place within 36 years and by putting the two blocks of wood together they show a tree of 21 inches in diameter, although from the way in which these blocks have

TREES 2½ x 2½ FEET APART AFTER TWO SEASONS' GROWTH.
PINEBARK (*Millia opulifolia*). ROSEMARY WILLOW—TEMPORARY. HARD MAPLE, WHITE ASH, WHITE PINE—PERMANENT. [p. 80]

been cut they do not actually represent the diameter of the tree, which is greater than that. To gentlemen who are interested in the growth of pine in this country these blocks will show what can be accomplished. They are two blocks, I, myself, picked out of a large amount of cordwood, and were grown on the Island of Allumette, on the Ottawa River. They are of second growth.

At 12.30 the meeting adjourned until 2 p.m.

AFTERNOON SESSION.

The CHAIRMAN called upon Mr. Stewart to read a paper prepared by Mr. James Leamy, Dominion Crown Timber Agent, New Westminster, B.C., on 'Forest Protection in the Railway Belt of British Columbia.'

Mr. STEWART said: Mr. President and Gentlemen, you will have noticed on the programme that we have been trying to have reports from every province especially regarding the timber and methods of fire protection. Unfortunately the paper from British Columbia was not received until about 12.30 p.m. to-day and as Prof. Goodwin, who is down for a paper on 'Forestry Education,' will not be here for some little time I am going to read this paper that should have been read yesterday. I may say that Mr. Leamy is the Crown Timber Agent for the railway belt in British Columbia and has charge of the fire rangers in the Dominion belt, which is a tract 40 miles in width, 20 miles on each side of the C.P.R. through the Province of British Columbia. Over that territory the Dominion has control; outside of it the province has control of the timber and therefore the Dominion Forestry branch has nothing to do with that.

Mr. JOHNSON.—You have charge of the 40 mile belt?

Mr. STEWART.—Yes, the 40-mile belt; that is 20 miles on each side of the C.P.R. There were a number of very destructive forest fires last year both in Washington and Oregon. I have a number of clippings from papers which show the amount of destruction, but I shall not take time to read them all. I shall, however, read a letter from Mr. Leamy, because it is a very important one on account of the very trying time they had last year and on account of the important work which Mr. Leamy did in protecting the timber. He says under date of New Westminster, B.C., 28th February, 1903:—

'DEAR SIR,—I have endeavoured to comply with your request in submitting a paper to be read before the Canadian Forestry Association at their annual meeting. I have not had sufficient time to study the matter out carefully, owing to the great pressure of business, but have tried to do the best I could under the circumstances.'

However, I think the paper will show that it is well worthy of attention. Before reading the paper I will read one or two clippings from American papers giving some idea of the immense destruction both to timber and farm property as well as the loss of life in Oregon and Washington last year. I will just read the heading of a despatch published in the Seattle *Post Intelligencer* on Sunday, September 14th, 1902:—'Twenty lives are lost in fire swept regions. Cowlitz county adds a dreadful list, including many human victims and property damages reaching large proportions.'

I cannot take time to read the account of it, but there are some other clippings here that I shall refer to. The number of acres actually burned over, according to one report

I have here, is 434,000 distributed in three counties. Then I quote from the *Daily Reveille*, New Whatcom, Washington :—

'It is the opinion of Mr. Cox, after tracking many of the fires to their origin that most of them could have been extinguished before they became serious. The lesson taught is that had there been an efficient system of forest patrol in these localities it is doubtful if any very serious fires would have occurred.' Then again :—

'After a careful trip through the regions devastated by the fires, Mr. Wm. T. Cox, who was detailed by the Bureau for this work, in a conservative estimate places the damage in Oregon and Washington at $12,767,100. Of this $3,910,000 is in Oregon and $8,857,100 in Washington. This includes all losses caused by the fires to farm property, saw-mills, manufactured lumber, standing timber, &c.'

I have another clipping giving an account of the damage on Vancouver Island. Then it gives the list of the dead in Cowlitz county and of the destruction which took place there. Speaking of a man who sought safety in the river, it says :—'While immersed in the river, he saw one of the grandest but most appalling sights in his life. Great balls of fire would roll up like cannon balls,' said he, 'and then burst with a mighty report. I have never heard a noise to compare with it,' he remarked. As soon as the fire had passed over him, he rushed to a neighbour's house and found that the family had been driven from home and escaped death.'

Here is something that bears very closely on what has been discussed here during the session. It is a clipping from a paper, but I cannot tell the name of the paper, and it is headed 'Preserve the Forests.'

'While there are enormous areas of very fertile land awaiting occupation by the settler in different parts of the Dominion, there are also large districts which are unfit for agricultural settlement, but which, if held by the country as timber lands, may be made to yield large and constant revenues. The rational and common sense view that the country should endeavour to make the best use of the heritage it possesses in its landed property, by directing the settlement of its best agricultural holdings where success in farming is easy, and retaining the poorer classes of land for timber growing, has not until recent years taken possession of the public mind. The wholesale destruction of forest properties by a lack of management and by destructive fires has aroused public attention and the wisdom of a better policy has become so apparent that the tide of public sentiment has set strongly in its favour. Hence, governments now have the backing of a large majority of intelligent people in every movement they make towards a rational policy in the treatment of a most important part of the country's wealth, which may with proper handling be made to yield a large annual income.' Then the next paragraph is just in line with one clause in our constitution :—

'Non-agricultural lands should be retained as forest reserves, and every effort should be made to protect the timber from destruction by fire. By careful selection of the timber these forests may be preserved for all time. Efforts should also be made to reforest some districts where the timber has been destroyed, or which are only lightly timbered, such, for instance, as the sand hill districts in Manitoba. There are other forest areas which should be preserved on account of their value as watersheds, in holding the flood waters back, and for their influence upon the climate of the country. The destruction of the watershed forests would be nothing less than a calamity to the country. The effect of the destruction of such forests would be to cause alternate floods and drouth.'

Bearing on this, is an article from a Vancouver paper signed by Mr. T. F. Paterson, who is well known in that part. The heading is : 'Comparative Immunity in B.C.—Work of Mr. Leamy and his Assistants is Appreciated.'

To the Editor of *The Columbian.*

Sir,—By recent reports it would seem that millions of dollars worth of timber has been and is now being destroyed by fires in the States of Washington and Oregon. Many of the forest timber limits have been almost totally destroyed, entailing heavy losses on the mill companies owning them. In contrast with this state of affairs, hardly any forest fires have occurred in British Columbia this year. This fact is largely due to the vigilance of the timber commissioners and their staff of fire rangers. During a dry spell, the timber lands within the railway belt are exposed almost continuously to fire. Although locomotives are required by law to be provided with spark arrestors, there is great danger from the sparks which escape the best kind of arrestor. Then tramps, who make the railway their highway, are making fires from time to time, and the timber agent and rangers have to be continually on the lookout for them. The government and owners of timber have much to thank Mr. James Leamy and his staff of fire rangers for, and too much praise cannot be given for the good work done by the Dominion Timber Agent for his vigilance in preserving the forests under his authority from fire during this period. On behalf of the Canadian Pacific Lumber Company, Limited, of Port Moody, I desire to extend our best thanks to Mr. Leamy for his efforts to preserve the timber lands under his charge, and I trust he will continue to put forth the same efforts in the future as he has done in the past to preserve the timber of this country. Sgd., T. F. Paterson.

Forest Protection in the Railway Belt of British Columbia.

JAS. LEAMY, *Dominion Crown Timber Agent, New Westminster, B.C.*

In accordance with the request of Mr. Stewart, I have much pleasure in submitting to the Forestry Association a short article on timber protection. The article in question must necessarily be brief, owing to press of work and lack of time for preparation.

As is well known, the great destroyer of our timber is fire, which works vast destruction and large areas of the forests have been totally devastated thereby. Fires are principally caused by settlers in the clearing of their lands, prospectors in search of minerals and campers on fishing and hunting excursions. They are caused also by sparks from locomotives and by lightning. From these various causes extensive fires occurred during the past season in the province of British Columbia,—that is, in the Kootenay country, on the western coast of the mainland, and on Vancouver Island. More extensive fires also occurred in the neighbouring States of Washington and Oregon. The loss of timber in these states is beyond computation. The papers there, in estimating the loss of timber caused by these fires, claim that the supply of timber in the Pacific States will be exhausted in less than forty years, and are strongly advocating that prompt measures be taken for the prevention of fires and reforestation to partially meet the losses that have resulted therefrom. They are likewise considering the proposal of adopting a system of fire wardency, such as we have in force in the Railway Belt in the province of British Columbia, thereby, as imitation is the sincerest form of flattery, showing their appreciation of and belief in the efficacy of the fire ranging system. In this province of British Columbia, on provincial lands, the loss of timber during the past season from fire was very considerable. There has been no estimate placed on the quantity burnt, but we may safely conclude it was very great, principally in the Kootenay district, where a large area of merchantable and young and growing timber was destroyed. On Vancouver Island the fires were also very extensive, but, owing to the difference in the size of the timber the fire would not be so destructive as that in the Kootenay. The larger timber in the Vancouver Island districts through which the fire ran will be available for use, although touched by fire, for some years to come. Its great size and thickness of bark saves it from much injury, while, in the interior, the

timber being smaller and the bark much thinner, if not utilized within a year it is a dead loss. In the Kootenay district, as far as I can ascertain, the fires were caused largely by prospectors. In the forty-mile belt in the province of British Columbia, under the jurisdiction of the Dominion Government, there were very few fires, none of which were at all destructive, with the exception of one fire which occurred on the Beaverfoot River on a limit owned by W. C. Wells. This fire was started by one of the employees of Mr. Wells, whom he employed as a watchman on the limit in question, but through his carelessness in setting fire to a quantity of rubbish about the camp when a strong wind was blowing the fire got beyond his control and burned, it is estimated, about a million or a million and a quarter feet of timber at most. Mr. Wells promptly closed down his mills and turned out all his men and succeeded in putting out the fire before any great damage was done. The merchantable portion of the timber is not lost, as it will be taken out by Mr. Wells this season and manufactured into lumber, but a large quantity of young and growing timber was destroyed by the same fire which would have been of merchantable value in about twenty years' time. In my opinion, formed from the experience of the past three years in endeavouring to prevent fires in the timber lands in the railway belt in the province of British Columbia, I find that the fire wardency system has been of great benefit, and, so far, has been productive of very good results, as very little timber has been destroyed in the railway belt by fire during that period, while quite extensive fires have occurred in districts not being looked after by fire rangers. The fire rangers have been very active in attending to their duties, and seem to grasp the situation thoroughly. They first ascertain where any clearings or slashings for the purpose of clearing land have been made. They call on the parties who have made slashings and notify them of their liability, under the Bush Fire Act, if they set fire in such slashings and allow it to get beyond their control. This, to my mind, has been very successful. The thinking men amongst the ranchers—that is, the more intelligent class of the farmers realize the disadvantage to themselves in having the valuable timber in their neighbourhood destroyed. It is always a source of revenue to them to have lumber camps working in their vicinity, as they are able to sell their produce and obtain employment for themselves and their teams in the logging camps during the winter season, and I find that those people are ever ready to notify the fire rangers when a slashing has been made that, to their mind, would be dangerous if not properly looked after, thereby being of great assistance to the rangers in the prosecution of their duties. Prospectors are the most troublesome class that we have to deal with. If they have an idea that there is any mineral in a range of mountains or hills they will, during the dry season, start fires whereby the surface of the ground may be burnt clear of vegetation so that they can the more readily trace any mineral deposits which they think may exist in that locality. The rangers in the eastern part of the belt, where a great deal of prospecting is being done, pay close attention to the going and coming of the prospecting parties. They get information from the different points where prospectors are in the habit of outfitting, and when they hear of a party starting out they call on the leaders of the party and furnish them with copies of the Fire Act, and call their attention to their liability in cases of fire set by them which may cause any damage, and also notify them that they are keeping watch over them. In fact, during the past two seasons I cannot see that any fire in the railway belt has been directly traceable to prospecting parties.

The officials of the Canadian Pacific Railway Company are taking a deep interest in the preservation of the forests, and are endeavouring to carry out the regulations as set forth in the Fire Act.

I may also say that the danger from the sparks from locomotives has been greatly lessened of late years owing to the fact that they are now using coal burning engines that do not throw as much fire from their smoke stacks as the wood burning engines did. The Great Northern Railway, which runs into the province of British Columbia from Blaine to South Westminster, opposite this city, have their engines equipped with sprinklers with which they can dampen, if necessary, any portion of the track which they are passing over, particularly the superstructure of the wooden bridges. They have also an arrangement whereby the cinders in the ash pan underneath the fire box of

the locomotive can be dampened before dropping the same on the track. This damping arrangement extinguishes any fire which may be in the cinders in the ash pan, thereby reducing the danger from fire from that source to a minimum. I would respectfully suggest that your Association should endeavour to impress upon the government the necessity of passing such legislation as would compel the various railroads operating in districts where fires are liable to occur, to adopt the Great Northern system, or a better one, if it can be devised. There have been no fires in this province which can be traceable to the Great Northern road, owing to the manner in which their engines are equipped.

In the prevention of forest fires in my judgment no system can surpass that of having a sufficient number of competent fire rangers to look after the forests. The men should have had practical experience in the woods and a knowledge of how to fight fires, construct fire breaks, &c., and should know their district thoroughly. They should be put to work during the month of May, posting notices, going through the district allotted to them, informing themselves as to the amount of slashing done and interviewing the parties engaged in clearing lands, cautioning them as to their liability should any damage arise from fires set by them, ascertaining what prospecting parties are out or liable to go out, interviewing them on the subject of fires and their liability for any damage which may happen through their carelessness or neglect in not extinguishing their camp fires when breaking up camp and setting fire for the purpose of burning off the surface of the ground in order to enable themselves to more easily prospect for minerals.

In regard to reforestation I am pleased to be able to say that through the railway belt in the province of British Columbia and, judging from that, I would say that all over the province, in parts that were burnt out some years ago, a new growth of timber has arisen, thickly covering the districts in question which, if properly protected, will produce this result, thereby relieving the country at large of the expense of replanting, and I would recommend very strongly that in the districts in which this new growth is showing the ground should be carefully gone over and selection be made of land that is not suitable for agriculture and that it should be reserved for timber, and these timber reserves be carefully guarded and not thrown open to settlement, and within a reasonable time the reserves in question will become of immense value to the country at large. Since I have been looking after the forestry interests in this province I am particularly struck with the value of the new growth of timber which I have mentioned.

With regard to legislation for the prevention of fires, the Legislature of British Columbia in 1896 passed an Act for the prevention of forest fires. This Act, after providing for the establishment of fire districts, enacted that it should be unlawful for any person to start fires between May and October, in or near any woods, in a fire district except for the purpose of clearing land, cooking, obtaining warmth, or for some industrial purpose; and in the event of a fire being set for any of these excepted purposes certain precautions should be observed. These precautions, so far as related to the clearing of land, were altered in 1902, and as the Act now stands, any fire started for clearing land during the prohibited period, shall be constantly watched over, managed and cared for by the person setting it, and every reasonable care and precaution shall be taken to prevent its spreading. The Act also provides that when a fire is started in or near the woods in a fire district during the prohibited period for cooking, obtaining warmth, or for industrial purposes, a sufficient space shall be cleared around it, and it shall be completely extinguished before it is left. A further section provides that in any prosecution the burden of proving compliance with the Act shall be upon the defendant.

The first point deserving attention is that our legislature has provided with regard to fires for clearing land, that they shall be watched over and cared for regardless of the question whether they are set in or near the woods. The reason of this provision is manifestly because fires for clearing land are usually of considerable magnitude, and may, unless carefully watched, spread far beyond the land on which they are originally set out, and readily assume proportions which render them difficult to control. Such a

fire set, say a mile or two from the woods, may under favourable conditions, e.g. a strong wind, readily travel over the intervening ground and growing as it spreads, do enormous damage when it enters the forest.

The Act is so worded as to make it unlawful to set such a fire, unless it is constantly watched and guarded, and every reasonable care taken to prevent its spreading. The only difficulty lies in being able to show that the fire itself has been started by the accused; once that fact is established, it becomes his duty to satisfy the court that he has fulfilled the requirements of the Act in constantly guarding it, and has taken all reasonable precautions in preventing its spreading. But unfortunately in the sparsely-settled portions of this province, where fire is resorted to as an agent for clearing land, it is extremely difficult to produce evidence to show that the accused set the fire. Witnesses can be obtained to prove that the fire started on the accused's property, but that is not sufficient; as the Act now stands, it must be shown that he set it. In the summer time, too, a considerable number of the people living on these clearings in the woods, are absent from their holdings; and this increases the difficulty. The mere fact that a fire is seen burning on a man's property is not evidence that he set it. It may have originated in a hundred different ways. In such circumstances it would seem that an amendment to the Act, providing that every one on whose land a fire is started shall be obliged to satisfy the court that such fire was not set by him, and until he does that the mere fact that the fire commences on his premises shall be evidence that he started it. This would mean that the owner of land if he did not start the fire could readily satisfy the court, by showing that he was elsewhere, or that it was started by campers or others. The origin of every fire is a matter peculiarly within the knowledge of the owner of the land, if he is living on it. The most indefatigable fire ranger cannot stand guard over each individual, or each piece of land; the fire ranger cannot, in the nature of things, know anything as to how the fire occurred; he can ascertain that it commenced on A's land; but he cannot give any evidence as to how it was started or by whom. Rarely does he reach the spot until the fire has assumed large proportions. He may suspect that the fire was started by A, but suspicion is not proof.

It cannot be a matter of difficulty for A, upon whose land the fire started, to show how it did commence; to satisfy the court that he did not start it, and if he did start it, then to satisfy the court that he took all reasonable means to prevent its spreading, but failed. The Act already provides that he, A, shall give evidence to satisfy the court that he took all reasonable precautions; what can be wrong in going one step farther and making A show how the fire commenced as well?

I submit the foregoing points for your serious consideration, with the hope that your Association will take such steps as may be necessary to secure more vigorous legislation concerning forest fires, in order that the great and valuable timber areas of this country may be saved from the immense destruction that has hitherto prevailed.

Mr. STEWART.—There is just one item here in a letter written to Mr. Leamy by one of his agents that I intend to refer to and then I have finished. He advises, very much in accordance with the Act in the State of New York, the establishment of two classes of fire districts and that it be made prohibitory to start a fire between July 15 and September 15. I am very much obliged to have had the opportunity of reading this paper. It is one of great importance. Perhaps some of the members of this Association were not aware of the destructive fires that occurred in Washington and Oregon and that right adjoining in the railway belt the writer of this paper, who deserves more reward than he has received, succeeded by his efforts in preventing these destructive fires from passing into the Dominion territory.

FORESTRY EDUCATION.

The CHAIRMAN.—The next paper we have on our programme is one on 'Forestry Education' by Prof. W. L. Goodwin, School of Mining, Queen's University, Kingston, Ontario.

Prof. GOODWIN.—Mr. Chairman and Gentlemen, when I was asked to prepare a paper on Forestry Education to be read before this Association, I gladly consented because it seemed to me that this would give an opportunity to bring before the Association the subject of a formal and regular education for the training of foresters and others. It may be interesting to know that while I am connected with the Mining School and devote myself pretty largely to education, I am not altogether without practical experience in lumbering. In my early life I have followed lumber all the way from the stump to the ship, I have surveyed limits, cut down trees, and even planted trees, which was a very rare thing in those days, and altogether I grew up in the lumberman's atmosphere, so that, as I have said, I am not without practical experience. This may give me some title to discuss with you here this afternoon the subject of forestry education.

Forestry Education for Canada.

Professor W. L. GOODWIN, Queen's University, Kingston.

There are still, it seems, a few people in Canada who are not convinced that the time has arrived for us to take steps towards a proper system of forestry, i.e., 'utilizing the forest and at the same time perpetuating it'. * The question is one of supply and demand. In other businesses the law of supply and demand can be trusted to bring about the conditions for a balance pretty rapidly, but in the case of the wood supply the adjustment is so slow that irretrievable damage may be done before the community is convinced that the supply has been reduced below the mark. An instructive example of this is the present condition of the United States with regard to white pine—not one year's supply in sight. The whole difficulty may be summed up in the inability of the average man to realize that it takes a hundred years to grow a tree which may be cut down in an hour. The forest is so much capital accumulated for our use by natural processes extending over hundreds or even thousands of years, as in the case of the great sequoias of the West. Capital must be kept in circulation, earning its annual increment. The forest is a crop to be used. Some eight years ago, I read a paper on forestry before a club of which I am a member, and put the case so badly that I was accused of advocating a system which would leave the whole country covered with trees. But that is not the intention of advocates of a system of forestry. There must be a proper balance between the area reserved for forest and the population of the country, for while a few thousand men could go on making money by culling out the best trees from half a continent, and there might be no end to this, if the forest is to be completely and economically utilized there must be people enough in the country to use at home the by-products of the forest, the small stuff, the poorer kinds of woods, &c., in fact the material which is not valuable enough to pay freight for any considerable distance. Thus lumbering is the only thing for a new sparsely-settled country the greater part of which is covered with forest; and the ordinary lumbering methods must prevail until the point is reached where it can be said that the forest capital is sufficiently reduced to be workable as capital earning its income. In this necessary process of reducing the capital, serious mistakes can be made and have been made in Canada. It is a rule of the forest business to reserve for permanent forest purposes (1) lands not suitable for agriculture, (2) lands on watersheds, &c., for protective purposes, and (3) lands suitable for the preservation of game. Two or all of these purposes may be and are served together. It is only necessary to take a journey through some of the neighbouring counties to see how badly we have managed in our choice of lands to be cleared of their forest covering. The bare rocks with great pine stumps standing on them attest our lack of foresight. The sand-swept farms of Prince Edward accuse us. The early and

* B. E. Fernow—Twelve Theses on College Forest Management.

destructive spring floods in many of our rivers bear witness against us. Even if it is granted then, that we still have plenty of forest and to spare, it is quite evident that, as pointed out in the President's address, we should have our forest areas carefully surveyed and mapped out by men who understand forestry, so that those parts may be set aside which are to remain permanently as forests.

And this should be done at once, before more mistakes are made, mistakes which it will take centuries to repair.

But there is strong evidence that we are within measurable distance of the balance referred to. Thirty or forty years ago pine was selling at $12 to $16 per thousand B.M. This comparative uniformity means that only the best pine was brought out of the woods. At present, pine is quoted at from $15 to $60 and a few choice lots have gone as high as $65. This wide range of price is due to the fact that the poorest lumber now finds a market as well as the best, the price of the latter having gone up 400 per cent in forty years. The average size of logs tells the same tale, pine logs going down (1887 to 1893) from an average of 122·5 B.M. to 98·5 and other kinds from 79 to 57 feet B.M.* Forest lands are increasing in value at a very rapid rate. I know of one case where a sale was lately made at an advance of over 100 per cent twelve months after purchase. All these things and many more often cited point to the hastening on of the time when we must stop using up our capital. The circumstances of Canada are peculiar in some respects, so peculiar that they should decide us to consider seriously whether it is not to our advantage to devote unusually large areas to forest purposes. In the first place we have perhaps an unusual proportion of land suitable for nothing else. Our long winters afford the best opportunities for harvesting the crop, our unique system of waterways gives cheap transportation to market; and, lastly, our impoverished neighbours to the south will buy all we can produce over and above our own needs, not to speak of the markets of Europe.

But will forestry pay? This is in some respects a difficult question to answer. It depends upon the sense in which the word 'pay' is used. That it pays in the long run there can be no question. The 35,000,000 acres of German state forests produce a net revenue of $1.80 an acre, equal to a net annual income of $63,000,000; and both capital and income are increasing. This is after some 150 years of forestry management; but the records show that the state forests have yielded a fair income from the start. Dr. Fernow told us recently in Kingston of German municipalities which paid all taxes and even declared a dividend from the profits of their carefully managed forests. In other European countries with less perfect systems of forestry, the net revenue per acre varies from $6.02 (Russia) to $1.05 (France). In our own case there can be no question that the introduction of forestry would reduce the large profits of the present system; but it cannot be too often repeated, these profits represent for the most part capital being eaten up. Ontario at present gets about a million and a quarter dollars of annual revenue from her great forest areas. Compare this with the sixty-three millions of Germany! Of course the lumbermen's profits should be taken into consideration, but they cannot be fairly placed over against the net income of the German forests, which represents only the profits on the annual growth. The total value of their forests is increasing, while that of ours is rapidly decreasing.

I realize that there are great difficulties in the way of introducing a system of forestry into Canada, but the greatest difficulty is our failure to realize that in this as in other activities we must keep the distant future in view. The generations to come are ever in the purview of the broad-minded man,—we are active for our sons and our sons' sons. Business foresight of the best kind should lead us to go in for forestry, even although the goal is a hundred years away. But on the whole, the subject is one for the state and the statesman. The Act of Confederation is just now beginning to give us its ripe fruit of national aims and aspirations. We have grumblingly waited since 1867 for these fruits foreseen by our great statesmen of that time. The idea had to grow slowly like the tree. Who will be our statesmen in forestry? 'The basis of all great modern industries is on scientific principles.'

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* Report of the Forest Wealth of Canada, Ottawa, 1895.

FOREST BELT—WHITE PINE. CENTRAL EXPERIMENTAL FARM. [p. 88]

But if we are to work into a system of forestry suitable to Canadian people and Canadian conditions we must have forestry education to train the small army which will be needed to manage, oversee, protect, and reap the forest crop. It will never do to depend on other countries to supply us with such men. Self-respect and good judgment forbid it. A review of what has already been done in Canada for forestry education will clear the way. In 1882 the American Forestry Association met in Quebec, and since that date Sir Henri Joly de Lotbinière, Wm. Little, A. T. Drummond, Dr. Robert Bell, Professor Macoun and many others have done much to educate public opinion. Since 1891 the Ontario Bureau of Forestry has collected statistics, diffused information, and improved fire protection. During these years forest reserves have been set aside by several provinces, and most of the provinces have established forestry branches or bureaus. The Dominion Department of Agriculture has done good service in the person of Dr. Saunders. The organization of the Forestry Branch of the Department of the Interior in 1899 is another mark in the rising tide of popular education. This Association, organized about the same time, has been a strong educative force. The cultivation and care of trees has for a number of years formed part of the course at Guelph. My own interest in this subject dates from Dr. Fernow's lecture before the Royal Society in May, 1894. I brought the subject before the Senate of Queen's University and convinced that body that something should be done in forestry education; but there were then no funds in sight for the purpose. Later the subject was taken up by the Board of Governors of the School of Mining, who engaged Professor Fernow to lecture to our students and others in January, 1901. At the same time the Act of incorporation was amended so as to include forestry among the subjects of education. Last month this step was followed up by a course of lectures by Professor Fernow, the first course on forestry given in Canada. This course attracted a good deal of attention, and the interest in forestry seems now to be widespread. The lectures are being published and will have a large circulation throughout the Dominion. One result of these lectures has been to determine several of our students to make forestry their profession. In order to do this they must complete a course of study; and our Board of Governors have determined to go forward next session as far as circumstances will permit them to make provision for such a course of study. The wherewithal is the only puzzling circumstance. Forestry is a branch of engineering. The best authorities on the subject, including Professor Fernow, consider that its theoretical study is most advantageously carried on at a university where other branches of engineering are provided for. These conditions are fulfilled in Kingston, another justification of the intention of our Board.

But it is quite plain that the mere opening of a school of forestry in Canada would not cause fifty or a hundred young men to seek its walls the first session. There is no great thirst for forestry education yet. The very meaning of it is just beginning to be known throughout the land, and forestry as a profession would be looked upon as very problematical by our practical youth. The conditions are somewhat similar to those prevailing some ten or fifteen years ago in mining, when the men who were studying mining engineering could be counted on the fingers. Now there are over two hundred students of mining engineering in Canada. When the school of mining was opened at Kingston nine years ago, the outlook for students was not more promising than it is now for forestry. To create the demand for such education was our problem. It was solved by three means: (1) *Short courses* for practical men (prospectors and others), held in January and February. These attracted many students, some of whom entered upon and completed a four years' course and are now practising as mining engineers. (2) *Summer mining classes* in mining camps and other centres. These classes have been found so valuable and popular that they are still being carried on, an annual appropriation for that purpose being made by the Ontario government. Students have been attracted to longer courses in this way. (3) *By exploring parties* of students and others interested, under the guidance of professors. In all these ways education in mining has been popularized, and *the supply of educated men has created a demand for them*, so that, at this date, graduates have no difficulty in securing employment.

The provincial and Dominion governments have helped on this movement by adopting in part a policy which they might well carry out *in toto*, viz., reserving for stu ents

of this class the minor positions on survey and exploring parties, and other scientific work carried on during the summer.

The educational problem in forestry is precisely like that just described, and a somewhat similar course will lead to the same results. There are large numbers of men now engaged in Canada in the care of forest areas. Some of these could be gathered to the school every winter for short courses of a simple and practical character, but scientific enough to open their eyes to the larger fields beyond. The professor of forestry would spend part of each summer in visiting places where forest interests are large. He would by lectures and class instruction spread the idea and arouse the interest of young men looking toward a scientific profession. Squads of men could be instructed every summer in the practical details of forestry, by assembling them on the forest reserve in charge of the school. Provincial and Dominion governments would naturally adopt the policy now pursued in the United States of employing students in the summer on their forest reserves and survey parties. But, it must be remembered that the great majority of ambitious and able young men in Canada are almost too poor to bear the expense of a scientific education. 'Earning their way' is undoubtedly a fine discipline, but it is often too severe a trial of endurance, and I have sometimes seen it fatal. There is another way—a ladder of learning. Great Britain is now pouring out her wealth in scholarships for this purpose. The Dominion might well make an annual appropriation to defray in part the expenses, at the school of forestry, of a certain number of students from each province, the selection to be made by a matriculation examination, or in some other way which would secure the ablest students. Fellowships or scholarships could also be awarded to the best graduates, in the form of appointments to certain junior positions in the departments of Forestry (Dominion and Provincial). In this way two purposes would be served, (1) Graduates would be initiated into their profession, and (2) The country would secure in time a corps of finely educated and practically trained men to work out our problems in forestry, irrigation and drainage. Private owners would, as in the United States, soon see the advantage of employing such men as managers of their forests; and the profession would thus become an established one. The profession is a most attractive one. Opening up of careers for sons of lumber men. Change of present method to permanent family inheritance.

Most European countries have a system of forestry education, including forestry facilities in the universities and polytechnics, special schools for the lower class of foresters, and forestry instruction in the agricultural schools. In Germany and Austria there are ten special forest academies in addition to the forestry facilities in three universities and two polytechnic institutes. These are for the education of the forest engineers. For the lower grades of foresters, there are twenty special schools. Provision for Forestry education is also made in India, Russia, Japan.

Sir JAMES GRANT.—Mr. Chairman, I should like to make a few observations. I may say in the first place that I desire to congratulate this Association on the admirable work that they are engaged in. Some twenty years ago I had occasion to bring up this subject in the Parliament of Canada and it was pretty elaborately discussed. I say, I believe at the present time there is no more important subject than that of forestry before the people of Canada. The forests are a source of revenue to this country to a very great extent, and this is made additionally apparent when we contrast the lumber resources of Canada with those of the American Republic and consider the very important fact, as announced by Prof. Fernow, that the revenue accruing to the American Republic from the output and sale of lumber is upwards of $1,000,000,000, which is more than the revenue accruing from the whole of the mineral interests of that country. It is very many times more than the result of the whole of the wheat crop, it is more than the revenue derived from the operation of the whole present railway system of the United States; and when we read the papers which have been produced by Prof. Fernow and the excellent department at Washington on the subject of forestry,

we cannot help admiring the great accuracy and intelligence that he has displayed and brought before the world on this very important subject by studying the question in the great centres of Europe, in Holland, in Belgium, in Brussels, in Russia, in France and in this country generally, and we find the whole subject is now receiving the most careful consideration in order to determine what can be accomplished towards the preservation of the life history of our forests. Living in the valley of the Ottawa, as I have for many years, I have on many occasions had my attention called to the very serious circumstances which have transpired in our valley resulting in immense destruction to our forests by fire. Let me say that I believe there is one circumstance connected with this question which is of vital importance and it is that the Government should not bring immigrants into our country for the mere cultivation of a small patch of land of a few acres when the presence of these individuals must result in encouraging the production of fires which spread into the surrounding forests and destroy millions of dollars' worth of valuable property. This whole subject is worthy of the most serious consideration. Those who are interested in the Department of Immigration and who are encouraging immigrants to go into certain sections of the country have the imperative duty imposed upon them to see that the necessary supervision is placed over these sections where these immigrants are allowed to settle, in order to use every means to stay the destruction of so valuable an asset as the lumber territory of our country. We know, again, that there are many important points connected with this whole subject of forestry and I am very much pleased indeed to have listened to the observations that have come from Prof. Goodwin to-day, inasmuch as he is connected with Queen's University, of which I happen to be a trustee with Sir Sandford Fleming, here to-day. I think that Queen's University was the first in the Dominion of Canada to establish a department of forestry for the education of the young men of our country who, in going forth can at once get employment, because this is a practical department concerned with the economy of our country by the saving of this vast territory that we have throughout the length and breadth of the domain of Canada. As Prof. Goodwin has told you to-day, no sooner have these young men graduated from Queen's than they are given employment, while the other professions of our country, such as law and medicine, are crowded to overflowing. Here is a department, sir, in its initial stage that has been established for the young men of our country who can go out from it and at once obtain employment, who by the exercise of their mental and physical powers will be able to guide and direct those who are dealing with the immense forests of Canada. Again let me say, this subject is one of vast importance. The exposition given to us last night by Prof. Jeffrey, of Boston, was of an admirable character.

The CHAIRMAN.—Prof. Jeffrey is a Canadian; I want you to mention that.

Sir JAMES GRANT.—Prof. Jeffrey of Boston is a Canadian—I believe a graduate of Toronto University, but, like many other Canadians, he is occupying a position of trust and responsibility in the great Republic. I am very much pleased to know that the sons of Canada come to the front in that country. The exposition given to us last night was one of an extremely high standard, and it is extremely gratifying to me to know that this subject is being guided and directed by the leading men of this country, because it is a department in which a great deal of practical work has yet to be accomplished. The Hon. Minister of the Interior, Hon. Clifford Sifton, last night made some admirable remarks upon the subject and I was glad to know that he had applied to Parliament

for a grant for the purpose of promoting this work. I am pleased beyond measure to know that a forestry branch of the Department of the Interior is now inaugurated and being carried on in the capital of Canada under his wise and judicious supervision.

When we remember that only three or four years ago there was actually more lumber destroyed in British Columbia in one season almost than the whole cut of that country since they first commenced to use lumber on the Pacific slope, we will at once appreciate the importance of forest protection. How is this destruction brought about? It is brought about largely by the fires instituted by the Canadian Pacific Railway, and I hope the day is not far distant when they will see the desirability of taking such action as will tend to prevent the spread of these fires and the destruction of our forests which has been so graphically brought before us to-day in the paper of Prof. Goodwin. I have very little more to say than to congratulate Prof. Goodwin and other gentlemen in this meeting on the admirable work of the Government of Canada in the planting of trees in the North-west Territories. We are aware of the fact that that country, notwithstanding that it was stated in the House of Commons thirty years ago that it would not grow a blade of wheat owing to its temperature, produced 80,000,000 bushels of wheat last year, and, as Prof. Macoun can tell us here to-day from his own knowledge, that the planting of trees in the North-west has done much to modify the climate conditions of the country. It is quite true that the building of railways, the planting of trees, the putting up of telephone and telegraph poles, and the cultivation of the soil have so modified and changed climatic conditions that the western country which was looked upon thirty years ago as a frozen territory to be known now as the great fertile belt of the North American continent, is going to produce more cereals than Great Britain will require for her people. I am pleased to have had the opportunity to be here to-day, and with these few observations, inasmuch as I know you have a noble work on hand, I wish you every possible prosperity in carrying out the aims and objects you have in view.

The CHAIRMAN.—We heartily thank you for the address you have given to-day. May I ask Sir Sandford Fleming to say a few words?

Sir SANDFORD FLEMING.—Mr. Chairman, I have listened with a great deal of attention to what has been said to-day, and as I simply came here to be a listener I shall ask you to excuse me from making any remarks.

Mr. J. H. FAULL, Toronto.—Mr. Chairman, I have listened, I may say, with great pleasure to the address of Prof. Goodwin to-day, and we are all glad to know that our universities are beginning to wake up to the interests of forestry education throughout our country. Prof. Goodwin has outlined to us very clearly the work that has been done at Queen's University, and I am very happy to say that Toronto University has likewise taken some steps towards giving a training in forestry. The subject has been under discussion now for two years, or more than two years, I am not positive at this moment, but it is only within the last year that the matter has taken something like definite shape. The reason for this has been that in Toronto University there are several important interests which have to be consulted, and one of these important interests is that of agriculture. The agriculturists have their college at Guelph under the control of the provincial government, and in order to meet the necessities of forestry in relation

to agriculture there has been perhaps some conflict of interests. However, that matter has been settled and in the arrangement, Toronto University has decided that the Professor of Forestry who will be appointed will be enabled to give instruction to the farmers who come from the agricultural districts throughout the province, in addition to giving scientific training to young foresters. It is also interesting to know that some of the best of our scientific students of Toronto University have already made application, just as Prof. Goodwin has pointed out in connection with Queen's, to take the course in forestry as soon as it is inaugurated. We hope it will be inaugurated as soon as the curriculum has been drawn up and presented to the Senate and the Senate have passed upon this curriculum. When this is done all that is needed is the wherewithal. We hope that will come very quickly. I may say, as far as this course is concerned that it will be a three years' course. The first year's course will embrace subjects now taken up in our general science course and will lay a broad scientific foundation. The following two years will be devoted to more technical subjects; the second year to forest botany, zoology, surveying, chemistry, physics and geology, and ultimately, work in forestry. At the end of the second year instruction will be given in one of the reserves, in which the students will come into practical contact with the forest. The third year will be given over almost entirely to the practical study of the subject under the direct supervision of the Professor of Forestry, who will, we hope, be a man thoroughly well-trained, who understands his subject from the practical standpoint after years of experience, and at the end of the third year the students will again be taken out into the forest and their training completed. I am glad that the subject has assumed such importance and that the universities are waking up to the necessity of giving instruction in it. Moreover, it is hopeful for the cause that this Association realizes the importance of scientific training in the subject.

Mr. STEWART.—Mr. Chairman, I may say I am very much pleased to find that the universities of this country are taking an interest in the subject for this reason. When organizing the branch in connection with the Department of Interior it was necessary to have some assistants, and the first assistant, Mr. Ross, was formerly in the North-west Territories, but had studied at a British school and at Biltmore Forest School, and also had the opportunity of seeing forest conditions in Germany, but he was chosen particularly for his knowledge of this country. It is only within the last few days that we have added to the staff a gentleman who has served his time in Germany, at Munich, taken his Doctor's degree, and who arrived only a few days ago—I refer to Dr. Unwin, who is here to-day. Though these foreign universities no doubt give a capital technical training, it takes some little time for a student, no matter how well trained, to learn the conditions of this country. For that reason, if we had foresters here they would naturally have the preference in any case in any province, and they certainly would as far as I am concerned. We have had a great many applications from Germans and others, but we have endeavoured to get British subjects. Mr. Ross is a British subject, Mr. Unwin is an Englishman who has studied in Europe. I am very glad indeed to see the universities starting into this work, because they will furnish us with young men who are acquainted with the conditions here. I remember when I first began to try to work up a system of forestry in this country, that I stated to the Minister that for us to adopt the systems in operation in Germany, or Belgium, or any other European country *in toto* would be unwise. I said that it would be as wise to transplant all

the trees of that country here and expect them to thrive under the conditions prevailing in this country. It is a matter of very little difference to the Government whether Queen's University or Toronto University furnishes the students, but it is a matter of very great importance that they be acquainted with the conditions of this country, and it will be, of course, very desirable to get a training in the country.

The CHAIRMAN.—We have with us to-day Dr. Finnie, of Montreal, a delegate from the North American Fish and Game Protective Association. I would ask Dr. Finnie to say a few words to us.

Dr. FINNIE, Montreal—Mr. Chairman and gentlemen, I am glad to have this opportunity to say a few words before my hour for leaving at four o'clock. I may state, at the meeting of the North American Fish and Game Protective Association, held in this very chamber in January last, I was appointed a delegate to represent that association here and to convey to you our kindly feelings towards the work you are engaged in. As you know our work is the protection of fish and game, and naturally our work leads us to the point where we take a keen and practical interest in your work of protecting our forests. The fact the aims of these two associations are so much alike, that the identity of interest is so strong, prompted us to send two delegates to the meeting of this Association. I find that I am the only one here today. I assure you that we have always realized what a magnificent work you are engaged in, remembering that its object is the protection of our forests. To a man who is interested in the woods, it is a sad sight to see these immense stretches of burnt country which confront us on all hands. I am sure I express the sentiments of our association when I say that we wish you every success in your noble work, and if there is anything we can possibly do in our association to further that work, we will be only too glad to do it. I only regret that I was not here yesterday to hear the various papers which were read, but those that I have had the opportunity of listening to to-day, have been very instructive indeed. I hope your Association will go on and prosper. I feel, in looking over your report, that instead of your membership being a few hundreds it should be up in the thousands. If the general population throughout the country knew about the work you are doing, a great many more people would certainly wish to become members. The community should be instructed how serious a matter it is to leave burnt embers about a camp fire. If your Association had the means to have suitable reading matter distributed freely throughout the country, it would be a great factor in educating the people on the subject of forestry. I am very much obliged to you, Mr. Chairman and gentlemen, for the opportunity of expressing the kindly feelings entertained by myself and the members of our association towards you.

The CHAIRMAN—Dr. Finnie, would you kindly convey our thanks to the Fish and Game Protective Association for sending a delegate here and for their very cordial greetings as expressed by yourself. I would ask Dr. Unwin to address us.

Dr. UNWIN—Mr. Chairman, I am very much gratified indeed to hear what Prof. Goodwin had to say on the forestry question. I think in his introduction to his address that he touched upon one of the most salient features of Canadian forestry. At the present time the lumbermen are very largely using up their capital, but in the settled portions of the country, particularly of this province, the time is coming when only the interest on the capital will be used and not the capital itself. On the subject of forestry

education I may say that I have had a long course of training, and I was gratified to hear Prof. Goodwin say that he favours university training on this subject and that provision has been made for imparting instruction at Queen's University. In Germany forestry education is of two kinds, either at the separate forestry school or at the university, and I think I am in a position to speak regarding the education imparted under these two systems. There is no doubt that the university course is by far the better. In the first place it gives a man a broader outlook, and in the second place a great point in its favour is that it is considerably cheaper as there are many general subjects which the student of forestry must have, which, if given at the separate school, require additional professors, but which, if given at the university, do not entail any additional expense and are as fully available for the students. Prof. Goodwin also mentioned that the course would be a four years one. This seems to be a very reasonable term. We need not copy the German system where the course extends over seven years. It must be borne in mind, however, that the forester cannot be made at the university. After all it is in the forest that the forester is made.

The CHAIRMAN—We shall now have a paper on 'The Effect on Fish Life of Sawdust in Rivers,' by Prof. Knight of Queen's University, Kingston.

The Effect on Fish Life of Sawdust in Rivers.

PROF. A. P. KNIGHT, *Queen's University, Kingston, Ont.*

Mr. President and Gentlemen,—I shall not read anything to you this afternoon, but give you briefly and hurriedly the results of some experiments with sawdust and the effect of sawdust upon fish life which I have been conducting for the past two years—not during the whole of the year, but during the summer months. I shall begin by dropping a little fine sawdust into this jar of water before me, and those of you who are interested in the rate at which sawdust sinks, and think you know about how quickly it sinks, might just take out your watches and look at them and see how long it will take for that sawdust to reach the bottom. While it is sinking I will be talking about something else and so shorten my address somewhat. I began this work at the suggestion of Professor Prince, the Commissioner and General Inspector of Fisheries for Canada. In 1899 he asked me to undertake some work of this kind, because, he said, although legislation had existed against throwing sawdust into our rivers for over forty years, we were really quite ignorant of what the exact effects of sawdust are on fish life. I began, therefore, two years ago, at St. Andrews, N.B. My first experiment was this: I captured three or four brook trout, I put them into a tank and covered it with cheese cloth so that they could not get out, I had a stream of water right in the brook in which I caught the trout and I turned this stream of water into the tank containing the trout and which also contained a large quantity of sawdust. I kept them there for three weeks and when I took them out they were quite as lively as when I put them in. One-third of the tank was full of sawdust, so that I concluded that as far as brook trout were concerned they were not damaged by a large amount of sawdust provided a fresh stream of water was flowing all the time. That was my first experiment. During the past summer—a year ago now—I conducted further experiments in the laboratory at Queen's University, and I will give you an idea of these experiments. The early ones were just of this character (calling attention to the jar on the table) and were just intended to ascertain how rapidly sawdust sinks. I do not think it has been over three minutes since I put that sawdust into this jar and you see that at least 75 per cent of it has sunk to the bottom of the vessel and the vessel is quite still. That was a surprise to me when I first made that experiment. Then I conducted experiments as to the sinking of sawdust of different kinds of woods—white pine, Norway pine, white

cedar, British Columbia cedar, hemlock, spruce, ash, elm, oak. I found that oak sank more quickly than any of them, next white pine, and that after that they varied as to the rapidity with which they sank because the conditions varied. I found that fine sawdust sank more rapidly than coarse. The coarser elements take longer to sink because the water does not permeate them as quickly. When I touch the jar you see they sink more rapidly. I had to make hundreds of these experiments. I have no theories,—I am giving you the facts. I may say that as to the sinking of sawdust the general result was that from 50 to 80 per cent of all kinds of sawdust sank in from two to three minutes, but the rapidity with which each kind sank varied with different conditions, first, for instance, the fineness or coarsenes of the sawdust; second, the kind of saw with which the sawdust was made. The big mill saw made sawdust that sank more quickly than sawdust made with a hand-saw. It also varied greatly as to the kind of jar in which it was put. You may put it in a perfectly quiet vessel and then into a vessel to which you give a slight jar with your finger, and you will notice a difference in the rapidity with which the sawdust sinks. In any case, however, 50 to 80 per cent of the sawdust sank in from two to three and from five to eight minutes. The speed at which the sawdust would sink would, of course, be modified out in the river, and I will speak of that separately, because, after I had conducted experiments in the laboratory for three months I went out to the river.

My next experiment was this: I took an ordinary aquarium tank about 3 feet long, 16 inches deep and 15 inches across. I got a bag of cheese cloth holding about a peck of sawdust. I put the sawdust into it and sank the bag to the bottom of the aquarium, the aquarium being filled with 16 inches of water. In 24 hours afterwards, in fact, in a few hours (but it was more marked in 24 hours) there came out from the sawdust a yellowish-brown liquid with a perfectly defined and clear-cut surface to it. The water above remained perfectly clear. There were about 14 inches of this clear water above and about 2 inches of the yellowish-brown liquid at the bottom and in the neighbourhood of the bag.

I went out one day and secured a number of perch eggs. You see the first question is the effect of sawdust on fish eggs, then its effect on the food of the fish in their young state, upon the food of the adult fish, and lastly, upon the fish themselves. So I got some fish eggs first. I put the fish eggs on top of the bag, in the clear water, and I put some of them down in the very bottom of the aquarium where they were mixed with the yellowish-brown water. In a few hours afterwards I examined them under a microscope. Those in the yellowish-brown water were dead, while those in the clear water were living. I repeated that experiment many times, then I took equal parts of clean tap water and the yellowish-brown water, making a 50 per cent solution; I then added the eggs and I found that they died similarly. I made a 25 per cent solution and got the same result only that it took a little longer to kill the eggs. Then, I gathered all sorts of material such as we know adult fish live upon, crawfish, tadpoles, aquatic worms and animals of that sort, put them into this yellowish-brown fluid and every one of them died without any exception, and that, not in a few hours, but in a few minutes. I captured perch and rock bass and they died in from two to three minutes in this strong yellowish fluid. The Department of Marine and Fisheries sent me, by Mr. Halkett, some black bass fry taken from a pond in the neighbourhood of Belleville. About 100 were sent. These would live two or three minutes in the yellowish-brown fluid and then they would die. So that the eggs, the fry, the food of the adult fish and the adult fish themselves were all killed in this strong solution.

Then I thought it would be interesting to get some comparative results if I could, as to the poisonous effects of white pine sawdust compared with red pine and hardwoods, and I performed this experiment. I took two grammes of each of the different kinds of sawdust, white pine, red pine, elm, ash, oak, maple, hemlock, spruce, hemlock bark, white pine bark, red pine bark and cedar bark, and I put them into different sized vessels. I put two grammes into a vessel containing 300 cubic centimeters. I do not know whether I should translate these weights and measures into the English or not. As I said, I put two grammes each into a vessel containing 300 cubic centimeters, into one containing 400 cubic centimeters, into one of 500, into one of 600, 800,

900, 1,000, 1,200, 1,500 and 1,700. I put all these vessels on tables and allowed them to stand 5 or 6 hours. Then I immersed minnows and black bass fry in each of these vessels, for each different kind of sawdust, and I noted carefully how long each animal lived. I expected, of course, that the most poisonous woods would kill the most quickly. The results of my experiments were these: White pine was of all these woods the most poisonous, and the next, British Columbia cedar. If the Dominion laws permit much of this cedar sawdust to go into the small streams, the results may be a little rough on British Columbia salmon. The third most poisonous is our own white cedar, and about equally poisonous are hemlock bark and oak bark. I found the hardwoods—maple, elm, ash, spruce, hemlock, the wood, not the bark, to be about on a par. But, as I said, white pine is the most poisonous, British Columbia cedar the next, our own cedar next, and along with it, cedar bark, hemlock bark and oak bark. The hardwoods I found to be very slightly poisonous. I kept minnows in the hardwood sawdust for six days and then liberated them. In the white pine sawdust they were killed in from five to eight minutes. In the strongest solution, that is the two grammes in a vessel of 300 cubic centimeters, the minnows would die in from five to eight minutes, while in the vessel containing 1,700 cubic centimeters with two grammes, they would die in about half an hour with white pine sawdust. In the red pine sawdust solution they lived from half an hour to two hours; in the cedar, from half an hour to three and a half hours in the weakest solution; and in the case of the hardwoods I kept them for a number of days—five to six days—and then I liberated them. My general conclusion was that the hardwood sawdust could not be considered very poisonous. You must remember that these were very strong solutions and if the legislation prohibiting the throwing of sawdust into streams and rivers were based upon such experiments as these, that is, a large amount of sawdust in a comparatively small amount of water, in which all fish life would be killed, the legislation would require no better justification.

Now, the next point that I tried to elucidate, was, this: What are the effects and results of decaying sawdust? In the case of decaying sawdust I left the sawdust in one of these aquariums for three months, noting the changes going on from day to day. At the end of four days gas was given off and the coloured solution came out just as usual covering the bottom two inches deep. Gas bubbles were coming to the surface, not to a great extent, but they kept coming at the end of a week or ten days. At first the fourteen inches of water at the top was clear and perfectly harmless to the eggs, the fish food and the adult fish. But at the end of a week or ten days this water as well as the yellow water at the bottom began to kill the fish, but for a very different reason. This water began to kill them because the oxygen was taken out of it. In the newspaper criticisms of the results of my experiments published in the report of the Department of Marine and Fisheries for 1901, one of the papers, the Montreal *Witness*, stated that the poisonous effects of sawdust were due solely to the fact that the sawdust took the oxygen out of the water. That is not true as regards the yellowish-brown water, The poisonous effect of the yellowish-brown liquid is due to the poisonous material dissolved out of the wood cells and the wood fibres. I was glad that Prof. Jeffrey lectured on wood structure last night, because his lantern slides brought out vividly the minute structure of wood. When certain materials, notably turpentine, resin and tannin, are dissolved out from wood cells they kill adult fish, fish eggs and fish food.

But it is quite different with the uppermost fourteen inches of water. In a week or ten days this water, which was originally clear and harmless, killed the fish because the oxygen was taken out of it. You want to know how I proved that. Well, I took out some of the clear water in which the fish had died; and I made the air bubble through it and when I bubbled the air through it for some minutes, it ceased to kill: the fish lived on and were quite comfortable and active in it. You want to know how I know that this yellowish liquid at the bottom was poisonous and that the oxygen had not anything to do with its poisonous effects. Well, I syphoned off some of this liquid, put it into a bottle, and when I put the fish eggs or young fish into it, they both died no matter how much air I bubbled through it.

As time went on the water that originally was clear above became very dark slate-coloured. The windows of the laboratory were open and at the end of May and in June

mosquitoes came in, laid their eggs in the water, and mosquito larvae that most of us used to call 'wigglers' became very abundant in that particular part of the water. A microscopic examination showed that the water was teeming with bacteria. The mosquito larvae were living on the bacteria. They would leave the top and go down to the bottom, remain there a little while feeding and then come up to take a breath. The bacteria were living on the wood extracts. They were there in immense numbers and the mosquito larvae were living on the bacteria. I drew off some of the water and put it outside of the laboratory where the sun could get at it, knowing that sunlight kills bacteria. It kills some bacteria and it also stimulates the growth of other bacteria. Between the sunlight, the bacteria and the wind, in the course of a few days, the water became fit for minnows to live in and I put some minnows into it and these minnows began to eat the mosquito larvae. So, you see we have this chain of nutritive relations, minnows living on the mosquito larvae, the mosquito larvae living on the bacteria, and the bacteria living on the liquid which oozed out from the wood. The only bit of Canadian literature I can get about bacteria in our rivers is a report by Mr. McGill, Public Analyst, Inland Revenue Department, who, a few years ago, analyzed the Ottawa River water and the Rideau River water. The literature which he published in connection with his work contained some determinations of the number of colonies of bacteria which he got from the Rideau River, and there were immense numbers of them. He found that, generally speaking, the more vegetable matter there is in water, the more bacteria are present. Different kinds of bacteria produce different diseases, but there is an immense number of bacteria that do no harm to man or beast and a small number of them are useful in industrial operations such as cheese making, butter making, the manufacture of ale, beer and wine and in fermentation generally. So, you see, there is no mystery about finding bacteria in sawdust water; there is nothing unusual about the fact that bacteria live on the wood extracts, and the wood extracts are there anyway. The same process is going on in our forest streams. Rain and melting snow running through leaves and branches carry vegetable extracts to rivulets. All our forest streams have immense numbers of bacteria in them in the purest water. I do not think there is any doubt as to the conclusion here; bacteria live on the vegetable extracts; insect larvae live upon these bacteria; and young fish live upon the insect larvae.

It occurred to me, in the next place, that I ought to go out into the forest and see what I could learn there. I was able to go to one stream only, the Bonnechere. I went to the Bonnechere River where there is a sawmill that has been running for a number of years, and up to two years ago it threw all the sawdust, edgings and slabs into the river. For a mile below the mill, the river is crammed full of old edgings, slabs, rejected shingles, lath and sawdust. I went up there as a result of my laboratory experiments, expecting that I should not find a solitary fish alive, because the Fish Commissioner of the Province of Ontario, in his report for 1899, said that there could be nothing more destructive of fish life than the depositing of sawdust in the rivers and lakes. It is quite true that Prof. Prince in this same year in his report told us that nobody had been able to bring forward one case to show that fish life had been killed by sawdust. So, you have the two doctors, one in the province of Ontario and the other in the Dominion service, taking diametrically opposite views on this question. Well, I went out to the Bonnechere and I will just indicate what I found. To my amazement almost any hour of the day I could walk for a mile up and down the river and catch fish, pike and trout—brook trout that are supposed to be so sensitive, that they turn up their noses at anything not quite to their taste. They are far more sensitive, according to some people, than human beings are. Mr. McGill, when he made his analysis of the Ottawa River water in 1892 as the result of a resolution passed by the Montreal City Council calling on the Dominion Government to stop the mill-owners throwing their sawdust into the Ottawa River because it was polluting the water, concluded, and he was backed up by the chief analyst, Mr. Macfarlane, that the sawdust did not do one particle of harm to the water so far as the water is used by human beings, but, of course, fish are far more sensitive and delicate and they turn up their noses at water that you and I could drink without any gastronomical difficulty whatever. We have then either

to admit that they are not injured by the relatively small amount of sawdust that goes into the water, or that if they are, they are far more delicate in their organization than human beings, and this is absurd. I quite agree with Prof. Prince; I do not believe that any healthy adult fish has ever been killed by sawdust passing into any waters. I want to qualify that statement. I am familiar with the Ottawa from Ottawa to Montreal, and with the Bonnechere River. I am speaking of these two, but I do not say that there are not conditions in connection with other rivers which might make the sawdust poisonous. I am reminded of a letter I got from a gentleman in Peterborough in which he said: 'I do not agree with your theory at all.' I am not speaking of a theory now; I have simply giving the facts. He said: 'I know better; I know that sawdust does kill the fish,' and he went on to give some facts in connection with the Otonabee River which I do not doubt, because I do not know. In the meantime, I am speaking about the Bonnechere River. I got from the proprietor of the mill an estimate of the amount of water passing his mill in 24 hours, and he also told me that his mill cut an average of 375 logs per day. I got from leading lumbermen in this part of the country, like Mr. Booth, the Hawkesbury Lumber Company, Mr. Edwards and others, their estimates of the percentage of a saw log that goes off in sawdust. Then I made a calculation of the percentage weight of 375 logs that went away in waste as sawdust, not taking slabs and edgings into account and I expressed that as a percentage of the weight of water passing in 24 hours and I got ·004. In the laboratory experiment in which the fish lived longest in the weakest solution with pine sawdust, the percentage was ·16. That killed adult fish in an hour and a half. If my figures are correct and the percentage was ·004 of sawdust thrown into the Bonnechere at that point, there was nevertheless 40 times more water for the fish than I had in my experiments when I found it to be fatal to the fish. That is the reason I am quite positive in saying that, so far as the Bonnechere River is concerned, I do not think fish life, eggs or fish food are injured in the slightest degree; but we have to take conditions into account in different rivers. Further investigation along other rivers is necessary. This much, however, is quite clear, the question of whether any particular stream is polluted with sawdust is simply the question of determining whether the quantity of sawdust thrown into the stream is sufficiently great to poison the water. In other words, it is a question of the strength of the sawdust solution—a comparatively small quantity of sawdust in a large river will do no harm; whereas a large quantity of sawdust in a comparatively small stream might kill eggs, fry, fish food, and adult fish.

Prof. MACOUN.—Prof. Knight's paper is the most extraordinary paper I ever heard until he came to the climax. I was perfectly satisfied that sawdust in the rivers was a very serious matter and in three sentences he upset all my previous opinions. I consider his paper the most valuable of the various papers I ever heard given on either this subject or any other one. He showed you exactly what took place. He led us to see and believe that fish life could not exist under certain conditions and he winds up by telling us that our rivers are perfectly safe, and any one who followed him will see that he is perfectly right. Now, the question is: What is the meaning of this paper? Is it to upset all our old views, or it is to widen our minds so that we can see that what we see is not so and that what we hear is not so? That is the question. A man that is half educated knows too much, a man that is thoroughly educated is a master and he knows exactly what he is doing and he sees the ultimate in all these things. A man who is only partly educated sees only a part and he believes too much. Prof. Knight has shown us to-day that with the great volume of water our rivers, into which sawdust is thrown, are perfectly safe for fish life. He assumes that our rivers, although impregnated with slightly deleterious matter, are perfectly safe for drinking purposes and fish production. He has given me so much light on this subject that I can almost see the whole question. Up to the present, I confess, I only saw one part of it, and that was

that throwing sawdust into the river was an unmitigated evil. I believe that still as far as the contamination of the water is concerned, but I cannot believe that it is so destructive to fish as I formerly believed to be. I think the paper is an exceedingly valuable one.

Unfinished Business.

Mr. Campbell.—I beg to move the resolution of which I gave notice in regard to the proposed change in the date of the meeting. Our constitution requires that we should meet on the first Thursday in March. This date clashed with the meeting of the Canadian Mining Institute, to which meeting a number of gentlemen who would be interested in our Association wish to go, and as that is an older institution than ours and one in which the members of the Geological Survey staff are very directly interested and wish to attend, thereby being prevented from attending our meeting, I propose this change. One of the members of the Geological Survey staff spoke to me about the matter and said that he was anxious to attend the meetings of our Association but that he had never been able to attend one of them on account of the Mining Institute meeting at the same time. He asked me if it were possible to make a change in our date, in such a way as to accommodate them. Therefore, in sending out the notice of this meeting, I put in a notice that a motion would be submitted providing for a change in the date of the meeting, and in the early part of this meeting yesterday I gave notice that I would move: 'That clause 7 of the constitution be amended by striking out the word "first" in the second line thereof and inserting the word "second".'

So that the clause will read: The annual meeting will be held on the second Thursday in March, at the City of Ottawa, etc.

I do not know whether there will be any objection to the change.

Mr. Robinson.—I think, perhaps, the reason for fixing the date we have in the constitution was that Parliament would be pretty sure to be in session, and that therefore we would have a greater attendance at the annual meeting.

The Chairman.—That is so.

Mr. Joly de Lotbinière.—I fancy that our meetings are not always held at Ottawa. As we propose to hold them at other places a change of the date of the annual meeting may be rather immaterial. I believe this is the time to state where we will hold our next meeting. It may not be at Ottawa. We may change our place of meeting. I trust we will for the next two or three years, so that the date perhaps is immaterial.

Mr. Stewart.—Notice has been given in accordance with the rules of the constitution that a certain motion would be made to change the date of the annual meeting. I do not think that there can be any objection to changing the date for a week. I wish to offer a suggestion and it is this: We have been meeting in Ottawa every year since the association was formed. I am of the opinion that it would be well to change around occasionally and I would like the opinion of some of the other members, and the reason I have is this: Probably the impression will go abroad that this association, instead of being a Canadian association, is an Ottawa association or that it is connected with Ottawa. In order to get over that and to enlist the aid and sympathy of a larger num-

ber of people I think it would be well to change the place of meeting for next year, and I would like to have the views of some of the gentlemen here on that point. I was thinking of the city of Toronto if the members from Toronto think well of it, I would like to have their opinion in any case, and if they think that we could have a good meeting there I would suggest this change. Mr. White and Mr. Southworth are here and I would like to hear their opinion on the subject before making any motion.

Mr. WHITE.—Mr. Chairman, I am quite satisfied that we would have a very successful meeting in the city of Toronto, and I think, in educating the people of Toronto and the vicinity in the subject of forestry we would be doing a valuable work. The general public do not take very much interest in this question because they have no opportunity of becoming acquainted with the valuable information which is being disseminated at this meeting. I think if the meetings were moved about from time to time, as has been suggested by Mr. Stewart, each locality in turn would have the benefit of the meeting of this association and of hearing the papers and discussions that take place. I think, therefore, it is a mistake, if we desire to educate the people of the province generally in regard to forestry interests, to keep the meeting in one place for ever. It is quite true that the Parliament of Canada meets here and your meetings are generally held during the session of Parliament, and consequently the legislators, the people who are called upon to make the laws in regard to this and other matters, have an opportunity of being present at the meeting. In the city of Toronto we have the legislature of Ontario which province is vitally interested in the deliberations of this association, and I think it would be a good idea to have the meeting there and enlist the co-operation and sympathy of the members of the legislature. I think that would be a valuable thing. Personally I would prefer that the meetings should not be held in Toronto because this is one of the few opportunities I have of going away from home, but those gentlemen who live in Ottawa, I suppose, would not object to taking a trip to Toronto once in a year and having the change which I am enjoying at the present moment.

The CHAIRMAN.—It seems to me that there is something to be said in favour of this peregrination because we want to get everybody interested. That is the way the American Forestry Association gets along. But lately they seem to hold their meetings at Washington for general business and then go to some other place for the discussion of papers.

Mr. J. B. MCWILLIAMS.—Mr. Chairman, before that motion is put, if we are going to change the date, perhaps it might be better to fix it later in March. We have been very fortunate in regard to our meetings, but March is a month in which our trains are often snowed up and I would suggest that we fix the date for the last Thursday in March. We will then be more apt to be free to attend. We have been pretty fortunate up to the present, but in regard to several other meetings I have been attending I may say we have been snowed in. I move that the meeting be held on the last Thursday in March.

Mr. JOHNSON.—I will second the motion.

Mr. CAMPBELL.—The only point about putting it so far back will be the question as to whether the House would be in session. The Dominion parliament, I think, would be in session at that time but I do not know whether the legislature would be.

Mr. SOUTHWORTH.—I think the postponement of the date to avoid clashing with the Mining Institute is putting it sufficiently far ahead for all purposes. I do not imagine there will be any serious difficulty about the snowbanks unless we decide to go to Greenland for our meeting. If we postpone it to a later date there will be danger, as Mr. Campbell says, in moving from one province to another of putting it beyond the close of the legislature or of parliament.

Mr. STEWART.—I think that perhaps, when you come to consider it, the last week of March is getting a little late, because people are then making preparations for the spring. I think the time proposed is perhaps the most idle period you will have. I think it would be better to carry the original motion.

Mr. McWILLIAMS withdrew his amendment and the motion was declared carried.

Mr. SOUTHWORTH.—I beg to move that the next annual meeting of this association be held in the city of Toronto. I, with Mr. White, would prefer personally to see the meeting held here; it gives us a little holiday and if we remain in Toronto we are not likely to get it, but if we can take some of the men I see here to-day, and I think we can, to Toronto, we can give you a very much better meeting than we have had yet and I think it will be very much to the interests of forestry in the western part of Ontario. We have had no meeting there at all. I find in some quarters a disposition to regard this as somewhat of an appendage of the Dominion Department of Forestry, that it is a sort of assistant to Mr. Stewart in a way, and I think it would be to the interest of the association at least once to have the annual meeting held away from Ottawa to have the idea thoroughly understood everywhere that while it is a Dominion association it is not a Dominion Government association. I think that holding the next annual meeting at Toronto and possibly the following one at Quebec or Montreal, would do much to dissipate that idea which, I am sorry to say, does exist in some quarters.

The CHAIRMAN.—I quite agree with that statement. I think it would be a benefit to the association to have the next meeting in Toronto and perhaps the subsequent meeting in Quebec, and I hope some gentleman will second the motion.

Prof. MACOUN.—I have much pleasure in seconding that. I believe it is a proper thing, as Mr. Southworth says, to cut off the appendage and not let it appear for a moment that we belong to the Dominion Department of the Interior or to any other government.

Motion agreed to.

Mr. JOLY DE LOTBINIÈRE.—I would like to propose the following resolution:—

'That in view of the continued deplorable loss of timber by fire, this association, whilst recognizing the work already done, would urge upon the governments of the country, both federal and provincial, the urgent necessity of giving more earnest attention to the subject of fire protection and would suggest, first, that the number of fire wardens and fire rangers be largely increased both on lands under license as well as on those which are not.'

To increase the number of fire wardens will mean that the laws that exist as to the setting of fires by settlers and the railway acts of the different provinces and the federal

Acts as to the precautions which should be taken by locomotives against setting fire, will be looked at and the fire wardens will be in a position, if their number is increased, to watch tourists, fishermen, lumbermen, prospectors and so on, and to increase the number of fire rangers I think is the best way to see that the law is carried out and made effective. The second proposal is this :

'That all lands, whether under license or not, be inspected as soon as practicable in order to determine those fit for agricultural purposes and those which are not ;

'Third. That all lands found unfit for agricultural purposes be declared forest lands and kept as such in perpetuity ;

'Fourth. That the governments should direct their efforts to centralization and contiguity in the settlement of any section of land declared fit for agricultural purposes and that settlement on isolated lands be absolutely prohibited.'

It is no use my discussing these four heads under which I have divided my resolution because they were most exhaustively discussed yesterday and to-day by this meeting. They are supposed to embody more or less the general opinion and feeling of the meeting as to the measures which should be adopted to ensure better fire protection.

Mr. WHITE.—I would wish that Mr. Joly had drawn some distinction between those provinces that are endeavouring to carry out fire protection very closely and those that are not. Now, I think so far as Ontario is concerned, that we have a very large staff of fire rangers in the field—some 234 upon licensed lands, some 12 upon lands of the Crown, some eight or nine on the forest reserve at Lake Temagami and eight or nine on the forest reserve at Algonquin Park, some 275 or 280 rangers altogether, some of them all the year round and some during the summer months. I think I have a fair knowledge of what is necessary in the province of Ontario on the lands of the Crown and unlicensed lands and I think that at the present time, so far as licensed lands are concerned, we have met the case very well. The licensees have been asked how many men they required and asked to appoint them, and in every case we have given the number of men. In addition to that we are prepared to put rangers on lands where the licensees do not ask for them, if necessary in order to protect the forests. So far as Ontario is concerned I think we need not be called upon as though we were neglecting our plain duty in the premises.

Mr. JOLY DE LOTBINIÈRE.—I am very sorry indeed that I worded my resolution in such a way as to give Mr. White certainly the right to feel slightly hurt, because, as we all know and I am the first to recognize it, his province has been in the van in the way of fire protection and I hasten to amend my resolution in a way which I trust will meet with his approval. I will read the preamble over.

'That in view of the continued deplorable loss of timber by fire this association, whilst recognizing the work already done and notably by the province of Ontario, would urge upon the different governments, &c.'

Mr. WHITE.—Yes.

Prof. MACOUN.—I second that motion just for the very reason that Mr. Joly has put in the last clause. It was to strengthen the hands of the Ontario government in New Ontario so that they could say that this society—an important society now in the Dominion—had passed a resolution showing the unwisdom of allowing settlers to go into the country indiscriminately, that is to find one farm here and another farm within a

few miles of it. It would strengthen the hands of the authorities in keeping such men out and directing settlement where it ought to go. That is really the idea I had in seconding the motion.

Motion agreed to.

ELECTION OF OFFICERS.

On the order being called for the election of officers:

The CHAIRMAN.—I may say, as I did yesterday morning, that there are other gentlemen whom I would like to see occupying the position I do. I thank the association exceedingly for the high honour they have done me in making me the second president of the Canadian Forestry Association. I do not know that it is the president's duty to name the officers of this association, but I think we all know a gentleman who would fill the position with credit and that we would all be glad if he accepted it.

Mr. JOLY DE LOTBINIÈRE.—I think we will all be unanimous in one thing here today, and that is in thanking Mr. Little for the devoted way, the energetic way, in which he has interested himself in all questions of forestry ever since the matter has taken hold of the public mind in Canada. Mr. Little has always been to the fore and we have been proud to have him here as president of this association. We take this opportunity of thanking him for the way in which he has presided at all our meetings, for the interest he has always taken, for the way in which he has put himself out, I may say many a time leaving his affairs aside to attend the meetings here. In every possible way he has shown the interest in this association that we should expect from a man such as Mr. Little. I will now propose that Mr. Hiram Robinson should be president of the Canadian Forestry Association for the ensuing year. I should propose that His Excellency the Governor General remain as Patron of the Canadian Forestry Association and that Mr. Little should be honorary president.

The CHAIRMAN—I thank you exceedingly but under no consideration could I desire to have the Association disassociated from the name of Sir Henri Joly de Lotbinière.

Mr. HIRAM ROBINSON—I do not know that Mr. Joly has a seconder in regard to myself, I might say publicly that I have had no desire to be president, that I felt that I should not accept the position and that Mr. Little should remain for another year in the chair, but I have been informed that there are constitutional reasons why the president should occupy the position but for one year. In this case I would be willing to accept the office.

The CHAIRMAN—I do not think there are any constitutional reasons because the chair has been occupied by one president for three years.

Mr. ROBINSON—I beg to ask the mover to withdraw the resolution. I will act very pleasantly and agreeably in any other position than that if it is the wish of the mover and seconder.

Mr. WHITE—If there is no constitutional reason why the president could be retained in the chair or why he should not, I think it would be very wise that we should pass the honour of the presidency of this Association round and I do not know of any gentle-

man better qualified to discharge the duties of president than Mr. Hiram Robinson. I am quite sure it would have a very good effect in our end of the province if it were known that a prominent lumberman of the Ottawa valley was president of the Association which was endeavouring to do everything possible to preserve the forests, because there is an idea amongst very many people in this country that the lumbermen's sole desire is to destroy the forests. I think the sooner that impression is removed the better it will be for all concerned, and I do not know any better way of removing that impression than by having an operator on a large scale, an active lumberman, in the president's chair of this Association.

The CHAIRMAN—I thoroughly agree with what Mr. White had said.

Mr. STEWART—Though there may not be anything in the constitution against the president occupying the chair for more than one year, yet, as this is a Dominion Association, and there are a great many prominent men all through the country taking an active interest in it, I think it would be well to make perhaps an unwritten rule that this office is to be passed around.

The CHAIRMAN—I agree entirely in that matter.

Mr. STEWART—I am sure we would be delighted to have Mr. Little retain it, but as the meeting will go from here to Toronto next time and as Mr. Robinson belongs to Ottawa, there is no doubt that his selection would be appropriate. The presidency would come from Montreal to Ottawa. It was first in Quebec, it then came to Montreal, and now to Ottawa and probably another time a president will be selected from some other place.

The CHAIRMAN—I do not see why the motion is not seconded and carried.

Mr. JOHNSON—We are making a precedent. You, Mr. President, have only been in the chair one year. Now, if we establish the precedent that a man shall be only one year in the chair the result will be that we will always have a contest and we will have some years a good man and some years a poor man. I think if a man has done well we might let him continue for another year rather than pass it round.

The CHAIRMAN—You might get a poor man and it might be hard to get him out.

Mr. ROBINSON—I certainly prefer that another man should take the position. While I consider it a very high honour to occupy the chair of such an important Association yet I have always been willing to work in the ranks and to help it in every way, and I would really prefer that somebody else would take the position.

Motion agreed to.

Mr. ROBINSON—Well then, if it is carried I thank the members for electing me to the position, and I must say that following upon Sir Henri Joly and Mr. Little it will be no bed of roses to me. They have both been men who have done very much for this Association. Sir Henri Joly de Lotbinière, who we all know is in British Columbia to-day, has been with it from its inception and Mr. Little so long as I remember anything about him has been connected with the lumber trade, and with forestry, and he has been constantly at work, in season and out of season, in promoting the interests of

forestry in this country and has done perhaps more than any one man I know of to make known the great resources we have, which we are all sorry to see, are being depleted by that terrible scourge—fire. Whatever we may all think and do in regard to this Association, it gives us much encouragement to observe the interest taken by the different governments in the work of protecting the forests of our country.

Mr. STEWART—The position of honorary president has been passed over.

Mr. JOLY DE LOTBINIÈRE—I had the honour to move a short time ago that Mr. Little should be named as honorary president to replace my father. I know there is no man in the room to-day that my father would sooner see occupying the position than you, Mr. Chairman, and I feel convinced that if he were here, he would do all he possibly could, as I will do, to make you accept that position. It will give him a great deal of pleasure to know that he is succeeded as honorary president by you, and I trust you will reconsider your decision and accept the position.

The CHAIRMAN—Under such assurances, if you gentlemen place me in the position, I will accept this honour with pleasure.

Mr. STEWART—It was mentioned a little while ago, I think, that we should pass these offices around, and as our late Vice-President has taken the place of the past President, and as the past President has gone up one higher, to the position of Honorary President, that leaves it open to submit some new name for the position of Vice-President and I have very much pleasure in moving that Mr. Aubrey White, Deputy Commissioner of Crown Lands for Ontario, be first Vice-President.

Mr. ROBINSON—I second the motion.

Motion agreed to.

Mr. WHITE—Of course I am very much obliged to you for the mark of confidence you have displayed in electing me to be Vice-President of this association. I am a pretty busy man, although it is a popular delusion that civil servants are not busy, but there are some that find their time almost completely occupied and I am in that position. However, in view of the fact that this association is going to meet in Toronto next year, and I may as Vice-President be able to do something to assist you, I shall be very happy to accept the position and do anything that in me lies to further the interests of the Association.

The CHAIRMAN—Next comes the Board of Directors.

Mr. MCWILLIAMS—I have much pleasure in moving that Mr. J. R. Booth be one of the directors. I always like to see a gentleman occupying one of these positions who takes an interest in the society. Mr. Booth has attended all the meetings so far.

Mr. ROBINSON—I shall have great pleasure in seconding that motion, but I would ask if we are not tied down to a certain number.

Mr. BOOTH—I beg to suggest that you leave the board of directors as it is at the present time. My son is one of the directors and that is quite enough.

Mr. ROBINSON—If we have room for Mr. J. R. Booth we will place him on the board and keep his son on as well.

Mr. JOLY DE LOTBINIÈRE—I move that the board of directors be composed as follows : Dr. Saunders, Prof. Macoun, Mr. Thomas Southworth, Mr. C. Jackson Booth, Mr. J. R. Booth, Mr. W. C. Edwards.

Mr. MCWILLIAMS—I suggest the name of Mr. John Bertram.

Mr. BOOTH—I hope the meeting will accept Mr. Bertram's name in place of my own. He is a man of large experience who has always taken great interest in the protection of the forests and I am sure there is no man I would rather see on the board than Mr. Bertram.

Mr. JOLY DE LOTBINIÈRE—Then I propose Dr. Saunders, Prof. Macoun, Mr. Thomas Southworth, Mr. C. Jackson Booth, Mr. J. R. Booth, Mr. John Bertram and myself.

Mr. SOUTHWORTH—I would be very glad to express my approval of that selection.

Mr. STEWART—I second the motion.

Motion agreed to.

Mr. JOLY DE LOTBINIÈRE—As there are two more officers to be elected, the secretary and assistant secretary and treasurer, if the gentlemen who have laboured so devotedly in the past, will assume the task again for another year, I am sure that every member of the association will be doubly grateful to them and therefore I propose that Mr. Stewart be secretary of the association and that Mr. Campbell be assistant secretary and treasurer. I trust that they will do us the honour of accepting these positions for another term.

Mr. STEWART—I would be glad to do so except that I regard it as being unjust that I should occupy the first place, when Mr. Campbell does most of the work. I really felt that I was leaving altogether too much to Mr. Campbell. For instance, when the arrangements for this meeting were being made, I lost track of them by being away. I was away until about a week before the meeting. While I shall be glad to do anything I can, I think Mr. Campbell should be considered as secretary of the Association. My duties are so great, that I cannot give the attention to the matter that I would like.

Motion agreed to.

Mr. WHITE.—Mr. Chairman, I would ask that you vacate the chair for a moment and allow the new president to take it. I want to move a resolution.

The past president, Mr. Little, vacated the chair and the new president, Mr. Robinson, took it.

Mr. WHITE.—I wish to move a resolution of thanks to the gentleman who has just retired from the chair. Mr. Joly has made some remarks in connection with the matter, but I think it would be better in the form of a resolution. There is no doubt that what

Mr. Joly has said is perfectly true that there is no man in connection with this association who has taken a more active interest or done more to bring it up to its present successful position than Mr. Little. Some ten or twelve years ago now I had the pleasure of meeting him at the American Forestry Association meeting in the city of Quebec and he was then as active and energetic in the discharge of the duties he performed in connection with that association as he is now. I also had the pleasure of meeting him in Chicago at the meeting of the American Forestry Association there where he delivered a very interesting address on the timber resources of Canada. In every way possible I think we must all admit that Mr. Little has done his duty as a member of this association and more especially has he discharged the duties of the presidency in an admirable way, being both courteous and kind and doing everything he could to promote harmony and order in the meetings of this association.

Mr. JOLY DE LOTBINIÈRE.—I second the motion.

Motion agreed to.

The CHAIRMAN (Mr. Robinson).—I have great pleasure in conveying to you, Mr. Little, the motion which has been adopted, and to thank you for the work that you have done not only for this session but during your past life in regard to the forestry of the country.

Mr. LITTLE.—Mr. Chairman and Gentlemen, I have to thank you most heartily for your kind expressions and I assure you that if I did not think it was in the interest of forestry that I should accept the honourable position that Mr. Joly has so kindly desired me to occupy, I never would have accepted it. I felt that there was more work for me to do and that possibly your confidence thus expressed in my fitness for the position might enable me the better to perform it. Gentlemen I thank you for your kindness.

Mr. STEWART.—Before adjourning, I may say that, as you are aware, we are very much indebted to the railways of the country for more than the usual assistance given to this association, inasmuch as they have not only given us a return fare but they have given it to us irrespective of the number of members attending the association. It is quite usual, in the case of fifty attending, that they allow a rebate, or a certain number, but all the railways have given the privilege without any conditions. I therefore move that the hearty thanks of this association be tendered to the several railway companies to whom we are indebted in this respect.

Mr. JOLY DE LOTBINIÈRE.—I beg to second the motion.

Motion agreed to.

Mr. CAMPBELL.—I move that the thanks of this association be presented to the press which has been so very kind in giving reports of the meetings of this association. I have had, as organizer of the meeting and assistant secretary of the association, to come a great deal in contact with the members of the press, and I can bear very decided witness to the courtesy and kindness with which they have received me, and to the cheerful manner in which they have always published notices concerning the work of the association. The reports of the present meeting, I think, have been very good, not only here in Ottawa but outside of Ottawa and I think our thanks are certainly due to the press for what they have done for this association.

Mr. JOHNSON.—Last year I moved that resolution and Mr. Campbell seconded it; this time he moves it and I second it, and I do so with the greatest pleasure, because I know that while on many papers space is very limited, they give us all the room we want.

Motion agreed to.

Mr. STEWART moved:

'That the hearty thanks of this association be tendered to the corporation of the city of Ottawa, for their kindness in allowing us the use of the council chamber.'

Motion agreed to.

Mr. SOUTHWORTH.—I would like to make one resolution before adjourning. A good deal has been said as to the efforts devoted to the success of this meeting of such men as Messrs. Little, Robinson, Joly and others, but I think you will all agree with me that a very great deal of the success of the association, so far as it has been successful, is due to a very large extent to two gentlemen, and that without the work they have done the thing would have been largely a failure. There are none of us perhaps who fully realize the amount of work that falls upon the secretary of an association of this sort. We are all apt to neglect our opportunities of doing work for an association of this sort and we all owe a great deal to the indefatigable efforts displayed by the secretary, and assistant secretary and treasurer. I beg therefore to extend the thanks of the association to these two gentlemen in connection with the editorial work they have done for *Rod and Gun* in addition to the ordinary secretarial work of the association. I know it entails a large amount of work and it has been very successfully done.

Prof. MACOUN.—I can second every word that Mr. Southworth has expressed and he has not said half enough. These gentlemen are indefatigable. It is due to the efforts of these gentlemen that the success of the society belongs.

Mr. STEWART.—I thank you for this vote, but, as I said before, Mr. Campbell is entitled to the credit more than I for the work which has been done.

Mr. ROBINSON.—I hope in the future that this society will be sufficiently strong to make some remuneration to these gentlemen for the work they have performed in the interests of the country.

Prof. MACOUN.—I purpose when the executive committee meets to bring the paper of Prof. Knight before the executive. I think it is all important that we should talk over this matter and have a resolution passed by the executive and also have, if possible, Prof. Prince deputed by the government to examine into this question that Prof. Knight has so well brought before us.

Mr. ROBINSON.—In regard to the effect of sawdust on fish?

Prof. MACOUN.—Yes.

The CHAIRMAN.—A paper was presented to this meeting at my request by the Hon. Mr. Ward, a member of the Legislative Council of Quebec, who came up to attend this meeting but had to leave for home without reading it. He has always taken a great interest in forestry, and is one of our oldest lumbermen. He left the paper with me

and I thought perhaps the association might allow it to be included in our proceedings. Is there any objections?

Prof. MACOUN.—It might be taken as read and it will then appear in the minutes.

The meeting adjourned at 5 p. m.

THE TIMBER OF CANADA.

Reminiscences and remarks by an old lumberman, the Hon. J. K. Ward, Montreal, Que.

The first timber shipped to Europe from Canada was sent from Quebec to Larochelle by Talon in 1667. Lieut. Hocquart shipped timber and boards to Rochefort in 1735. In 1823, 300 cargoes were shipped from Quebec.

In the early part of the present century, the Montmorency mills established by a Mr. Usboirne. Mr. Peter Patterson, a ship carpenter by trade, who had spent some time in Russia, became an employee of Mr. Usboirne's, and finally proprietor of the property, and became one of the largest manufacturers of lumber in Canada. Sir John Caldwell established mills at Rivière-du-Loup en Bas and at Etchemin. The late William Price, father of Hon. J. Price, of Quebec, established large mills at Chicoutimi, St. Alexis, L'Anse St. Jean, St. Etienne, Batiscan, Matane and many other places, leaving an immense business to his sons, which is now conducted by the son before named. The late Allan Gilmour, and relations of the same name, carried on for many years a large business on the North Nation, the Gatineau and Mississippi (Canada), and at Trenton, Ont., the younger branches of the family continuing the business.

Philomene Wright, one of the first lumbermen on the Ottawa river, came from Woburn, Mass., in the United States, arriving at the Chaudière Falls—or the Asticou, as called by the Indians—as early as the year 1796. It was not till 1797 that he finally decided to make his home in Canada, and on the 20th October, 1799, he and two companions pitched upon the site of the future city of Hull. He finally quitted Woburn for Canada on the 2nd of February, 1800. He was accompanied by five families, and had in his train fourteen horses, eight oxen and seven sleighs. The first tree was felled on the site of the homestead on the 7th of March, of the same year. He brought the first square timber from the Ottawa to Quebec in the year 1807. He built the first slide on the Hull side of the river in 1829. He was elected the first member to represent the county of Ottawa in 1830. He died in 1839, and sleeps, an honoured memory, in the little cemetery on the Aylmer road. Philomene Wright built his first saw and grist mills in 1808; they were, unfortunately, burnt down, but were rebuilt in sixty days.

About eighteen years prior to this the first saw-mill on the Ottawa had been built at Point Fortune, by a Mr. Story. It boasted one upright saw, and it is recorded that when the man in charge gigged back the carriage for a fresh cut, he would sit down on the log to take his dinner, and was about through by the time the cut was finished. With our present saws the same can be done in four seconds.

Among our successful lumbermen have been the late James McLaren, of Buckingham; Peter McLaren, of Perth; Bronson, Weston & Co., Perley & Pattee, J. R. Booth, Alex. Fraser, of Westmeath; W. Mackey, and the late firm of Hamilton Bros., whose father was one of the first in the trade at Hawkesbury, Ont. Many others have taken an active part in the business, with more or less success.

West of the Rocky Mountains, Canada contains vast quantities of valuable timber, the manufacture of which is rapidly increasing, to meet the wants of the Pacific coast and islands. Much of this lumber will find its way east to the treeless prairies.

As to the Canadian method of lumbering, when circumstances will permit, we pile or skid before the snow becomes too deep. When the snow is deep we draw direct from the stump to the lake or river. Our style of living in the shanty, and, in fact,

the building itself differs in the various parts of the country. Until very recently, particularly in the lower St. Lawrence, the fare of the shantyman was very primitive, the commonest tea being quite a luxury, and the only variety in the bill of fare was that it consisted of pea soup, bread, pork and beans for dinner, the same, with the addition of tea for supper, and either, less the pea soup, for breakfast. On the St. Maurice, for many years, the living has been good and substantial, with comfortable shanties provided with stove, tables and bunks, the cooking being usually done in an outside compartment. The shantyman's condition, however, is improving with the times.

Our shantymen, whether English or French, as a rule, are as good axemen, and expert drivers and canoemen, as can be found in any country. Our people are well up in dam building, as well as in making slides and clearing away the rivers to facilitate driving. Our rivers, as a general thing, being very precipitous and rapid, require extensive improvements, especially for the running of square timber.

I can hardly let the occasion pass without a reference to two of our woods, the first because of its usefulness to the poor aborigine, whose heritage we possess; it served to cover his wigwam, and was the material for his canoe, to aid locomotion; the latter, the great wood of commerce.

The white birch, or bouleau, has within a few years become of some value when found within easy reach, having been turned to account for the manufacture of spools and spool wood for thread makers, the white part of the wood only being used. It is made into squares, varying from one inch, in eighths to, say, two inches, and three or four feet long. Many shiploads have been shipped to England and Scotland the past few years, principally from the lower St. Lawrence. The red, or heart, being worthless to the spoolmakers, is either used as firewood or left to rot. There are vast quantities of this wood in the interior, too far from navigation or rail to be of any value. It is mostly found on poor soil, mixed with balsam, small spruce and cedar. It makes good firewood when dry. The bark is useful to the Indian for the making of his canoe, the vessel for retaining the sap of the maple, his drinking cup and the cover of his wigwam. The yellow birch provides a cough remedy by boiling the sap down to a syrup; and last, though not least, it furnishes the proverbial birch-rod, which, though almost obsolete, sometimes does good service, even in these days of advanced ideas. Vast quantities of the dwarf or black birch have been used as withes in rafting logs, some concerns using as many as thirty or forty thousand in a season, each of them representing a young tree; but little of this is done at present.

We now come to what every lumberman considers the king of the forest, in grandeur, usefulness and value, the white or cork pine, or *Pinus strobus* of the scientists, the tree of all others that serves more purposes that we can enumerate. Among them the tiny match, the mast for the great ship, the frame of the sweet sounding piano, and wherever a soft, easy-working wood is wanted, either in the arts, the workshop, or the factory, there it is to be found. As an article of commerce, it far surpasses in value and quantity any other wood, if not all sorts put together. It supplies more freight for vessels coming into the St. Lawrence than any other commodity; it gives more employment to wage-earning men than any industry in our country, except agriculture. It employs more capital in manipulating it from the time the men leave for the woods in the fall, to make, haul and drive the logs and timber to the mills—the building of mills for sawing, the construction of barges and steamboats to convey it to market, as well as the large amount of freight furnished to railroads, the erection of factories to convert it to the various uses to which it is put. It is safe to say, that the value of the output of pine lumber alone, produced in Canada, is at least $25,000,000, or two and a half times as much as that of any other manufacturing industry; and, when we consider that 60 per cent is paid for labour, and that nearly all to men, representing a large population, it it is readily seen how important it is, either by legislation or otherwise, to protect and conserve the source of this great factor in our prosperity. How can we extol sufficiently this monarch of the forest that we are so much indebted to? The tree when growing in the open country is of little or no value, except as a shade tree, its lateral branches reaching almost to the ground. It is in the dense forest we have to look for the great

tree of commerce, where nature acts the pruner. There the branches decay and drop off, the trunk shoots upward high above its neighbours, seeking that which it was deprived of below—light and air. By this action of nature we get our clear pine, so much prized by mechanics. As the branches drop off, the wood grows over them, and we get the stately tree carrying its size well up, and often attaining 60 or 70 feet to the branches. I once saw a tree that measured 40 inches in diameter 70 feet from the ground, without a knot or defect visible in this space. Naturally, however, it is very rare to get a log or the best of timber without finding knots or defects as you get near the heart, the remains of the dead branches that fell off during the tree's slow growth. My experience teaches me that white pine is of slow growth. The smallest trees that ought to be taken for sawlogs or timber should be at least fourteen inches at the butt. This would take not less than fifty years to produce, and such a tree as I have before described as much as one hundred and fifty; more than three inches in twenty years. Large groves of pine are usually found on poor light soil, I think, consequently, that the bulk of the pine found under such circumstances is apt to be punky or defective for the want—so to speak—of nourishment. The best pine is usually found on stronger soil mixed with hardwood. It is unpleasant to contemplate the want of this valuable timber. Once gone it is gone for ever, and cannot be reproduced in our or our children's time, as unlike mineral or the other products of the soil, the quantity produced from these are limited by the amount of labour employed in producing them. Perhaps, however, time will find a substitute in some artificial wood, or employ metal to take its place.

Hardwoods, to which I will briefly refer, that were once almost discarded, except for burning, are coming largely into use in consequence of the improved wood-working machinery that has been devised of late years, making the work of preparing and completing joiner work much more simple and easy than it was to do the same thing in pine when I served my time over 50 years ago, and when flooring, mortising, tenoning, sticking mouldings out of dry spruce with hard knots, was done by hand. The facilities also for reaching hardwoods and getting them to market will help to make up for the loss of this favourite material, which, I hope, is yet a long way off. I might say before closing this part of my subject that the magnificent cedar of British Columbia will, no doubt, largely take the place of white pine for joiner-work. The Douglas fir will be a valuable substitute for our coarser woods, when they become scarce and high in price. A lumberman's life is not passed on a bed of roses, yet there is a charm about it to those who have the stamina to endure its hardships, and enjoy its excitements, that is not easily forgotten. Who, that has followed it, can forget the log drive from early morn to sundown, kedging across the lake to the tune of the *chanteur*, or breaking the jam in the roaring cascade, whose noise is drowned by the yells and shouts of the crew on seeing the great mass move off, each great log, as it were trying to get ahead of its neighbour, until they reach still water. What excitement after the risk run and efforts made! Old lumbermen can and do look back to such scenes with much pride. What other business has so many contingencies connected with it, apart from the ordinary mishaps in trade?—sometimes too much snow, other times too little. On other occasions the ice or the floods carry away his booms and scatter the logs, to be often stolen by land pirates, who will secrete his property, and annoy him in trying to find it.

As to the utility of the forest, though it may not attract the rain or influence its downfall, there can be no doubt as to its regulating the flowing of the waters by holding them back in the glades and swamps, sheltering the land from the fierce rays of the sun, preventing rapid evaporation to a great extent, and thus preventing oftentimes damaging floods and dried-up streams. For the reasons advanced, does it not behoove us to use our influence to bring about such legislation as will have the effect of preserving and protecting our forests, on which so much depends?

R. H. CAMPBELL, Treasurer.

In account with The Canadian Forestry Association.

DR.			CR.		
To Balance from 1901	$	313 61	By subscriptions to '*Rod and Gun*,' 1901	$	144 50
" Membership Fees		260 75	" Travelling Expenses		2 50
" Interest		5 81	" Advertising		19 12
			" Report of Annual Meeting		80 00
			" Expenses of Lecture		23 00
			" Printing		24 00
			" Subscriptions to '*Rod and Gun*,' 1902		176 75
			" Express charges, Photographs, &c.		4 15
			" Balance		106 15
		580 17			580 17

Examined and found correct.

GEORGE JOHNSON,
JAS. M. MACOUN, } Auditors.

MEMBERS OF THE CANADIAN FORESTRY ASSOCIATION.

Ami, H. M., M.A., D.Sc., F.G.S., F.G.S.A.	Ottawa, Ont.
Anderson, J. R.	Deputy Minister of Agriculture, Victoria, B.C.
Aylsworth, W. R.	Belleville, Ont.
Alexander, A. E	Campbellton, N.B.
Alexander, P.	Regina, Assa.
Aylmer, Hon. F. W., C.E., P.L.S.	Golden, B.C.
Atkinson, W. F. V.	1 Des Grisons St., Quebec, P.Q.
Allen, H.S.	Cardston, Alta.
Butler, M. J.	Deseronto, Ont.
Bell, Robt., B.A.Sc., M.D., LL.D., F.R.S., F.R.S.C., F.G.S., F.G.S.A.	Geological Survey, Ottawa, Ont.
Bostock, Hewitt.	Ducks, B.C.
Booth, C. Jackson	Ottawa, Ont.
Boyd, M. M	Bobcaygeon, Ont.
Bertram, John.	9 Walmer Road, Toronto, Ont.
Bell, Jas. A.	St. Thomas, Ont.
Benjamin, S. P.	Wolfville, N.S.
Bryce, Rev. Geo., M.A., LL.D.	Colony street, Winnipeg, Man.
Baird, Thos.	Crystal City, Man.
Brown, Alex	Glenora, Man.
Beavis, H. J.	Crystal City, Man.
Burke, Rev. A. E	Alberton, P.E.I.
Barnhill, Geo. E.	Fairville, St. John, N.B.
Bryce, W. H	Percy, Assa.
Bronson, F. P.	Ottawa, Ont.
Backus, Don. T.	Biltmore, N.C., U.S.A
Bertrand, J. T.	Rivière du Loup, P.Q.
Beaupré, Arthur P.	842 St. Catherine Street, Montreal, P.Q.
Barnhill, B. B.	Two Rivers, Cumberland County, N.S.
Boyce, H. F	Qu'Appelle Station, Assa.
Ball, John	Abbotsford, B.C.
Brandley, Theo	Stirling, Alta.
Blackmore, Wm.	Cardston, Alta.
Beazer, Mark	Beazer, Alta.
Burn, Geo	General Manager Bank of Ottawa, Ottawa, Ont.
Burland, Lt.-Col. Jeffrey H.	Montreal, P.Q.
Bagge, Richard.	Quebec, P.Q.
Baillargé, Chevalier Chas	72 St. Louis street, Quebec, P.Q.
Bryant, Edward S.	56 Plympton St., Cambridge, Mass., U.S.A.
Brownlee, W. H	Crystal City, Man.
Bickerdike, R., M.P.	Montreal, P.Q.
Campbell, R. H.	Ottawa, Ont.
Costigan, Hon. John	Ottawa, Ont.
Creighton, Graham	Education Office, Halifax, N.S.
Conant, Thos	Oshawa, Ont.
Cochrane, W. F.	McLeod, Alta.
Cowan, Wm	Prince Albert, Sask.
Campbell, A. C	House of Commons, Ottawa, Ont.
Cambie, H. J.	1030 Georgia street, Vancouver, B.C.
Carpenter, H. S.	Trent Canal office, Gamebridge, Ont.
Card, Mrs. Zina Y.	Cardston, Alta.
Carrol, Cyrus, C.E., O.L.S., D.L.S.	Prince Albert, Sask.
Campbell, F. J.	Canada Paper Co., Windsor Mills, P.Q.
Cavana, A. G.	Orillia, Ont.
Chipman, Willis, B.A.Sc., C.E	Toronto, Ont.
Comstock, Prof. F.M., Ph.D.	School of Applied Science, Cleveland, Ohio.
Colter, Jas.	Crystal City, Man.
Caldwell, John.	Virden, Man.
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Campbell, Arch. M.	Post Office Dept., Ottawa, Ont.
Coltart, Ian.	Beulah, Man.
Cassels, Hamilton, 19 Wellington St. West.	Toronto, Ont.
Campbell, Arch. H., Manning Arcade.	Toronto, Ont.
Cary, Austin.	Brunswick, Maine, U.S.A.
Chown, Geo. Y.	Queen's University, Kingston, Ont.
Cooper, D. G.	Collingwood, Ont.
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Cowie, F. W., Public Works Department.	Ottawa, Ont.
Crooker, W. S.	Brookfield, N.S.

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Cummings, J. G. Fort Steele, B.C.
Commerce, Manager of the Bank of. Barrie, Ont.
" " " " Belleville, Ont.
" " " " Collingwood, Ont.
" " " " Wiarton, Ont.
" " " " Peterborough, Ont.
" " " " Sault Ste. Marie, Ont.
" " " " Cranbrook, B.C.
" " " " Vancouver, B.C.
" " " " Victoria, B.C.
" " " " Waterloo, Ont.
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Dickson Co'y, of Peterborough. Peterborough, Ont.
Ducker, W. A., D.L.S., 334 Pacific Ave. Winnipeg, Man.
Davis, John, O.L.S. Alton, Ont.
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Gifford, Prof. John, 109 Summit Ave. Ithaca, N.Y., U.S.A.
Gamble, Capt. Killaly, 88 Charles St. Toronto, Ont.
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Mather, John, 453 Theodore Street.....Ottawa, Ont.
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Roche, John D., 665 City Hall Ave. .....Montreal, P.Q.

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Ross, Norman M., B.S.A., Dept. of Interior	Ottawa, Ont.
Rutherford, Wm., 85 Atwater Ave	Montreal, P.Q.
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Rat Portage Lumber Co.	Rat Portage, Ont.
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Southworth, Thos., Director of Forestry	Toronto, Ont.
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Spring-Rice, B	Pense, Assa.
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Scott, Miss Mary McKay, Department of Interior	Ottawa, Ont.
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Stephens, Hon. G. W., 845 Dorchester St.	Montreal, P.Q.
Simpson, Geo., 24 Russell Ave	Ottawa, Ont.
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Scott, Hugh.	Lethbridge, Alta.
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Turner, Richard, Box 400	Quebec, P.Q.
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Toumey, Prof. J. W., Yale Forest School	New Haven, Conn., U.S.
Thompson, Wm.	Crystal City, Man.
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Taylor, John	Clearwater, Man.
Ussher, C. E. E., General Passenger Agt., C.P.R. Company.	Montreal, P.Q.
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Williamson, Wm., Room No. 8, 30 St. John St.	Montreal, P.Q.
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Walker, B. E., General Manager Bank of Commerce	Toronto, Ont.
Wilson-Smith, R	Montreal, P.Q.
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The secretary will deem it a favour to be advised of any errors or omissions in this list.

CANADIAN FORESTRY ASSOCIATION

SIXTH ANNUAL REPORT

1905

OTTAWA
GOVERNMENT PRINTING BUREAU

ARNOLD ARBORETUM,
JAMAICA PLAIN,
MASS.

REPORT

OF THE

SIXTH ANNUAL MEETING

OF THE

CANADIAN FORESTRY ASSOCIATION

HELD AT

QUEBEC, MARCH 9 and 10, 1905

OTTAWA
GOVERNMENT PRINTING BUREAU
1905

CANADIAN FORESTRY ASSOCIATION

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11398—1½

NOTICES

CANADIAN FORESTRY CONVENTION.

A Canadian Forestry Convention has been called by the Right Honourable Sir Wilfrid Laurier, Premier of the Dominion, to meet in Ottawa, on the 10th 11th and 12th January, 1906, to discuss the forests and forest conditions in Canada. All interested in forestry are invited to be present.

CANADIAN FORESTRY ASSOCIATION.

The objects of the Canadian Forestry Association are:

The preservation of the forests for their influence on climate, fertility and water supply; the exploration of the public domain and the reservation for timber production of lands unsuited for agriculture; the promotion of judicious methods in dealing with forests and woodlands; re-afforestation where advisable; tree planting on the plains and on streets and highways; the collection and dissemination of information bearing on the forestry problem in general.

This association is engaged in a work of national importance in which every citizen of the Dominion has a direct interest. If you are not a member of the association your membership is earnestly solicited.

The annual dues are $1. The life membership fee is $10.

Applications for membership should be addressed to the Secretary,

R. H. CAMPBELL,

Ottawa, Ont.

SIXTH ANNUAL MEETING

OF THE

CANADIAN FORESTRY ASSOCIATION

The Sixth Annual Meeting of the Canadian Forestry Association was held in the Council Chamber of the City Hall, Quebec, on Thursday and Friday, March 9 and 10, 1905.

Among those present at the sessions were: Aubrey White, Assistant Commissioner of Crown Lands, Dr. Judson F. Clark, W. H. F. Addison, E. B. Biggar, editor *Pulp and Paper Magazine;* H. R. Muir, *Canada Lumberman*, Toronto; Hon. H. Bostock, F. W. Jones, R. Jardine, Jas. Leamy, of British Columbia; E. Stewart, Dominion Superintendent of Forestry, Dr. Robert Bell, Director of the Geological Survey, Gordon C. Edwards, Norman M. Ross, Roland D. Craig, H. C. Wallin, R. H. Campbell, Ottawa; E. G. Joly de Lotbiniere, H. M. Price, W. C. J. Hall, Monsignor Laflamme, Hon. P. E. Leblanc, Hon. R. Turner, E. Baillarge, J. C. Langelier, Revd. T. W. Fyles, H. O'Sullivan, W. F. V. Atkinson, J. Champoux, C. Lampson, J. S. Scott, E. M. Nicholson, E. E. Taché, Deputy Commissioner of Crown Lands, and others, Quebec; Wm. Little, Hon. Recorder Weir, Douglas Weir, Thos. Walklate, Montreal; J. T. Bertrand, Isle Verte; Col. T. G. Loggie, Fredericton; A. E. Alexander, Campbellton; E. J. Zavitz, Ontario Agricultural College; Professor Filibert Roth, University of Michigan; Dr. C. A. Schenck, Biltmore, N.C.; A. Knechtel, L. S. Emmons, Albany, N.Y.; Angus McLean, Buffalo; W. G. Power, St. Pacome; S. P. Grogan, Batiscan; Mossom M. Boyd, Bobcaygeon; G. S. Wilgress, Huntsville; S. W. Farnham, Martinville; Jos. M. Dalton, Three Rivers; Hiram A. Calvin, Kingston.

The meeting was called to order at 10.45 by the chairman, Mr. Aubrey White.

The secretary read the minutes of the last annual meeting, which were adopted.

A telegram from Mr. Hiram Robinson, expressing regret at being unable to attend, and wishing the association a successful meeting, was read by the secretary. A communication from Mr. T. M. Robinson, Gravenhurst, was also submitted, calling particular attention to the necessity for doing something to reforest the denuded tracts of the Muskoka district, and districts of that nature, where farming was mingled with the forests, and had resulted in their destruction without any effort to replace them; and also one from Mr. F. W. Godsal, of Alberta, stating that the fires had been serious in the west during 1904, and asking that the attention of the association be called to the fact in order that some action might be taken. A letter from Prince Colleredo Mannsfeld, of Austria, was also submitted, in which he expressed

his regret at not being able to be present, and extended a warm welcome to any members of the association visiting Austria.

REPORT OF THE BOARD OF DIRECTORS.

The report of the board of directors was read by the secretary as follows:—

The board of directors of the Canadian Forestry Association beg to submit their report for the year 1904-05.

The report of the last annual meeting was published at the Government Printing Bureau through the kindness and at the expense of the Forestry branch of the Department of the Interior. This report has been distributed as usual to the members of the association, members of the legislative bodies throughout the Dominion, the press and others. The annual report places the proceedings and deliberations in a permanent form, and makes them available for reference and study. The report for the past year is well up to the character of previous reports, both in material and illustrations, and the thanks of the association are due to the Dominion Superintendent of Forestry for so kindly arranging to carry what would have otherwise been a necessary but heavy expense to the association.

The following were appointed as vice-presidents for the year: Ontario, Hon. E. J. Davis; Quebec, Hon. S. N. Parent; New Brunswick, His Honour J. B. Snowball. Lieutenant-Governor; Nova Scotia, Hon. J. W. Longley; Prince Edward Island, Rev. A. E. Burke; Manitoba, Major Stewart Mulvey; Assiniboia, His Honour A. E. Forget, Lieutenant-Governor of the North-west Territories; Alberta, Wm. Pearce, Calgary; Athabasca, F. D. Wilson, Fort Vermilion; British Columbia, Hon. Hewitt Bostock; Keewatin, the Lieutenant-Governor of Manitoba.

During the year the association has lost some of its most active members by death. Mr. John Bertram, a member of the board, and one of the strongest supporters of the association, passed away after a lingering illness. He took a large and helpful part in the proceedings of the last annual meeting, and the papers he has presented to the association at different meetings have had a strong influence in the formation of public opinion on forestry and the shaping of the forest policy of Canada. As a member of the Ontario Forest Commission he did good service to his own province, and he had been called to exercise his talents in a wider sphere as chairman of the Dominion Transportation Commission. His loss will be felt through a wide circle, both in public life and among his more intimate friends. Dr. W. H. Muldrew, who was also present at the last annual meeting, died suddenly in October after only a few days' illness. As dean of the Macdonald Institute at Guelph, he was beginning the development of a work in nature study that promised much for the future interest of children in the trees and natural objects. Mr. W. C. Caldwell, M.P.P., of Lanark, and Colonel Thos. Higginson, of Vankleek Hill, both leading lumbermen, and members of the association, have also died during the year.

We are sure that all the members of the association will sympathize fully with our honoured first president. His Honour Sir Henri Joly de Lotbinière, and with our vice-president, Mr. E. G. Joly de Lotbinière, in the loss they have sustained in the past year by the death of Lady Joly de Lotbinière. The board have conveyed an expression of their sympathy to the bereaved relatives.

MEMBERSHIP.

The secretary has made a special effort during the year to increase the membership of the association by the sending out of copies of the annual report and invitations to membership in the association to persons whose names were submitted by members. The result has been fairly satisfactory, and has resulted in a considerable increase in membership. This has been somewhat discounted by a falling off in Mani-

toba and the North-west Territories. Following is a comparative statement of the membership for the past two years:—

	1904.	1905.
Nova Scotia	14	21
New Brunswick	14	22
Prince Edward Island	1	3
Quebec	98	113
Ontario	134	187
Manitoba	80	72
Assiniboia	23	22
Saskatchewan	3	4
Alberta	60	42
British Columbia	25	32
Newfoundland	—	1
United States of America	24	32
England	2	5
Ireland	—	1
India	—	1
Honolulu	—	1
Germany	1	1
Denmark	—	1
Austria	—	1
	479	562
Life members	33	39

The receipts for last year were $1,845.77, and the expenditure $930.66, leaving a balance on December 31 last of $915.11. The amount now standing to the credit of the association is $989.75, but against this is the account for the *Forestry Journal* for January, amounting to $150, and the expense of this meeting, about $100. The thanks of the association are again due to the governments of the provinces of Ontario, Quebec and British Columbia for the grants given by them to the work of the association.

OFFICIAL ORGAN.

In accordance with the instructions of the last annual meeting, your board took steps to arrange for the publication of an official organ to be devoted to the interests of the association and the advancement of the forestry movement generally.

Tenders were asked from several printing firms, and it was decided to accept that of the Rolla L. Crain Printing Company, of Ottawa, being the lowest, the contract to run for one year. Dr. Wm. Saunders, Professor John Macoun and Mr. E. Stewart were appointed provisionally as an editorial committee, and Mr. R. H. Campbell as editor and business manager. The first number of the *Canadian Forestry Journal,* the name decided on for the paper, was issued in January, and has been distributed to the members of the association. The intention is to issue quarterly for the present, with the hope that the future may lead to a development that will permit a more frequent appearance of the *Journal.* The board would like to impress on the members of the association the necessity for their rendering every assistance to the editorial management to make the magazine thoroughly representative and generally useful.

The whole question of the official organ is submitted for the consideration of the association, and it is desirable to have a full expression of opinion upon it.

The publications of the association do not, however, as yet reach as wide a public as is desirable, and the question of accomplishing this purpose by the publication and distribution of bulletins, by providing material for the public press or by special means for reaching the educational institutions, might be placed in the hands of a special committee for consideration.

FOREST COMMISSIONS.

The Forestry and Colonization Commission of Quebec has submitted its report to the government of that province. This report is full, clear, and is evidently the result of a careful weighing and consideration of the evidence submitted by persons interested in all sides of the question which came under the scope of the Commission. Some of the conclusions of the Commission in general are:—

That there is no antagonism between the holders of timber licenses and real settlers or those who honestly take up public lands with the view of clearing them and not of speculating in the timber.

That the number of speculators in government lots and in timber, already very considerable, is constantly on the increase. These interlopers are the scourge of colonization, a subject of continual trouble and, on occasion, of serious losses to the license holders and the government. The extraordinarily increased value which all woods have attained within four or five years, has caused this practice to spring up in all parts of the province and the operations have assumed proportions which have become almost a menace to the legitimately conducted lumber industry.

The first measure necessary is the division of the public domain into settlement lands and merchantable timber lands. There is a great deal of land unsuited for profitable cultivation as much by the nature as by the conformation of the soil, but very richly timbered. It would, therefore, be in the interest of the province to form these lands into forest reserves.

That the system of protection against forest fires is insufficient, and requires an increase in the number and an improvement in the personnel of the fire-ranging staff. Further restrictions as to the time and methods of setting out of fires for clearing land are recommended, and the necessity for educating the people to the need for care in handling fires is urged.

The Forestry Commission of Prince Edward Island presented its report at the last session of the legislature. The commissioners state that as almost the whole of the land in that province is held by private owners, it is evident that practical forestry must in the main be dependent for its success on private effort. This private effort should be directed and encouraged in every way possible, and it is in such direction and encouragement, the commissioners consider, the government can best, and with least expense, bring about the reforesting of such parts of the province as have been unduly denuded, can assist in preserving the forests which still exist, and can incidentally do much to beautify the appearance of the island.

The commissioners recommend that experiments might be made in planting on the white sand barrens, that the planting of trees on farms should be encouraged for the protection they afford to orchards and crops, and for the supply of firewood and timber, that planting should be done along the public roads, and that, through the schools, education should be given in regard to the value and the care of trees.

FOREST FIRES.

The resolution passed at the last annual meeting recommending the prohibition of fires for clearing in the province of Quebec, except from June 15 to August 31, was transmitted to the government of that province, and that urging protection to the watersheds was sent to the different governments throughout the Dominion.

The resolution relating to the prevention of fires along lines of railway, and especially in the construction of the new Transcontinental road, was transmitted to the Dominion government and to the representatives of the railway companies. Replies were received from the Department of Railways and from the general manager of the Grand Trunk Pacific Railway, stating that the question would be given careful consideration, and steps taken in the direction indicated by the resolution. As this is a question of the utmost importance and urgency, the association may very well reaffirm its attitude thereon.

Forest fires are still causing destruction in Canada, although their extent has been largely controlled by the fire-ranging system now generally adopted through the Dominion. British Columbia has, outside of the railway belt which is protected by Dominion fire rangers, suffered the most severely, as the season was dry throughout, and that province has, unfortunately, in spite of its great forest wealth, not provided for a fire ranging force such as has proved effective in other parts of Canada. In Nova Scotia the Fire Warden Service established under the Act passed at the last session of the legislature, has proved successful in the counties in which the system was inaugurated. The report of the Crown Lands Department shows that numerous fires were prevented or extinguished in their incipiency, and the loss in many counties, large in previous years, has been reduced to a minimum.

Under Dominion jurisdiction there were forty fire rangers employed, and the result was that there was very little destruction by forest fires, except in the Crow's Nest Pass, where there was great difficulty in controlling them. The success in the railway belt in British Columbia in preventing loss was most marked, and to show how the cost of a fire-ranging service is saved over and over again in the value of the timber protected, it will be permissible to quote from a letter received by the Dominion Forestry Branch from the Columbia River Lumber Company as follows:—

'We feel satisfied that without the fire ranging system and the extra work which was done in the last six weeks, practically all the timber tributary to Shuswap lake would have been destroyed, and, as you know, this amounts to a good many hundreds of millions of feet.'

TREE PLANTING.

The tree planting scheme under Federal management in Manitoba and the North-west Territories continues to develop. During the year 1904, 1,800,000 trees were distributed to 1,027 settlers, an average to each of 1,752 trees. In 1905 the distribution will be 2,000,000 trees to 1,120 settlers. The Forestry branch has so far sent out about 5,000,000 trees and 2,000 pounds of tree seed. Educational work in this connection is being done by addresses at the meetings of farmers' institutes, and a forestry exhibit was shown at the Dominion exhibition at Winnipeg.

In Ontario a beginning has been made in the setting out of a nursery at the Ontario Agricultural College at Guelph, from which the farmers of that province may obtain supplies of forest trees for planting. Lectures on forestry will be given at farmers' institutes and gatherings of a similar nature, to explain the plans of the government, and furnish general information on the management of trees.

In view of the difficulty experienced in British Columbia through the starting of fires in the clearing of land, your board at its meeting on October 27 last passed a resolution, which was transmitted to the government of that province, suggesting that the Bush Fires Act should be amended so as to prohibit the starting of fires for the clearing of land between the first day of May and the first day of November in each year, unless a special permit for the purpose be granted by the forest ranger or other officer appointed for the district in which such permission is asked.

In the first week of January of the present year, a forest congress was held at Washington, which was attended by a number of Canadian representatives. The congress brought together some four hundred people, representing not only the scientific foresters and the forest enthusiasts, but practical and leading men in the lumber industry, in railroad management, in mining, in irrigation and manufactures, men whom the practical necessities of the case had forced to take an interest in forestry and who showed by their presence and active interest that forestry is no longer a fad but a business question of supreme national importance. The effect of this meeting on the public of the United States should be far-reaching and it is a question worthy of consideration as to whether the time has not arrived to make a special effort of a similar nature in Canada.

A committee representing your board waited upon His Excellency Earl Grey recently to ask him to be kind enough to act as patron of the Canadian Forestry Association. His Excellency received the committee most graciously, and was pleased not only to consent to give his patronage, but far exceeded their expectations by stating that he would be pleased to do anything further in his power to assist the work of the association, and suggested that, in the event of an evening meeting being held in Ottawa during the present season he would be pleased to attend, and might arrange to have it held at Government House. This kindly action of His Excellency, and the evidences of sympathy with movements affecting the well-being of the Dominion, should give him a high place in the respect and affection of Canadians, and especially of the members of the Forestry Association.

The thanks of the Forestry Association are due to the press for their interest in its work and the notice given it in their columns from time to time, to the railway companies who have again kindly granted single fare for the annual meeting, and to kindred societies from whom assistance has been received in various ways.

PRESIDENT'S ADDRESS.

The PRESIDENT.—Gentlemen, we have now finished the formal business of our meeting, and the next subject on the programme is the president's address. Circumstances over which I had no control have made it impossible for me to prepare a written address. As most of you are aware, I am a very busy man, and this must be my excuse for not coming better prepared to address you.

There are, however, some things in connection with forestry generally and the particular work of the association to which we belong as to which I would like to say a few words.

Before entering upon the business which claims our attention, I desire to congratulate myself particularly upon the fact that this meeting, over which I have the honour to preside, is being held in the ancient capital of our country. There are many reasons which make it pleasurable to hold the meeting in the old city of Quebec. Here is the birthplace of nearly every development that has made this great Dominion the important country it now is. Here is the nursery of christian missionary work, of exploration, of commercial enterprise, of parliamentary government, and of education. Apropos of education, let me say how delighted we are to have with us this morning so distinguished a churchman and scholar as Monsignor Laflamme, who is here to support the cause and take part in our deliberations. His presence is a compliment to us, and as president of this association I tender to him its thanks for the honour of his presence.

Here, too, in the old days was exhibited that martial spirit that has always distinguished the two races from which we are sprung, the Anglo-Saxon and the Gallic. These races met in the shock of battle not very far from where we are assembled, of which battle nothing now remains, thank God, except the glorious memories of the bravery of our ancestors, and the examples of the great leaders, Montcalm and Wolfe, who offered up their lives for the honour of their countries. After what I have said, it is perhaps unnecessary to add that when we, the sons of Canada, come to this ancient city, we feel that our feet are upon hallowed ground.

I must also say how greatly indebted we are to the Quebec Forestry Association for all the kindness and courtesy it has displayed, and for making such excellent arrangements for the holding of this meeting, and to the city council of Quebec I

desire to express our thanks for having placed at our disposal its beautiful council chamber.

In connection with the subject of forestry, we are at once reminded that here, during the French regime, were promulgated the first timber regulations made on the continent of America, and it is interesting to know that some of the questions and difficulties that confronted the earliest rulers of this land have persisted during all the years since, and are as live and difficult questions to-day as they were hundreds of years ago,—for instance, the question of the right of settlers to take timber for building purposes, to cut and dispose of timber required in clearing their land for cultivation. In fact we have, running through the crown timber regulations of the provinces of Quebec and Ontario like a golden thread, certain principles that were formulated hundreds of years ago, and this is a very curious as well as interesting fact.

Now, coming to the formation of forestry associations on this continent, I think the first impetus given to anything of this kind was at a meeting held in the city of Montreal in the year 1882, which was the first meeting in connection with forestry matters held in the Dominion of Canada. The good seed sown at that meeting and at the meeting of the Forestry Association held in this city in the year 1890, at which I had the pleasure of being present, has taken root and grown to proportions upon which we may fairly congratulate ourselves. A reference has been made by some of the previous speakers to the kind interest taken in our work by the present Governor General. This recalls to my mind that Lord Stanley, now Earl of Derby, when Governor General, attended the sessions of our meeting in 1890, and commended us for the important work in which we were engaged. From 1890 down to 1900 nothing was done in the direction of creating a distinctly Canadian forestry association, though the American association had come into existence and many of us were members of it. In the latter year, however, Mr. Stewart, who has done so much for forestry in Canada, took in hand the formation and organization of the Canadian Forestry Association. It was established in Ottawa, and since then has been progressing, slowly, I regret to say, but still progressing along the lines we had marked out for the society.

The importance of the objects the association had in view was clearly understood by those who brought it to life. Those of us who took an interest in forestry knew the enormous forest wealth of the provinces of this Dominion, that we had forest resources which, if taken care of, were sufficient to provide large revenues for public purposes for an indefinite time, provided they were protected, conserved, and the timber was disposed of upon sound public principles. This association hoped, amongst other things, to impress upon the various governments interested the wisdom of taking steps to protect and husband the forest wealth entrusted to their care by a beneficent Providence. Particularly we felt that much might be done to prevent the great destruction of timber incident to forest fires. Experience had taught us that when a forest fire gets fairly started it would be impossible for even an army of men to suppress it, but we knew that much could be done to prevent the starting of forest fires if some system were devised which would inculcate a spirit of care in the use of fire on the part of settlers, hunters, lumbermen, explorers and others who might be in the forest during the dry summer season. It was thought that by placing a number

of men, to be called fire rangers, at various points in the forest during the hot summer, whose duty it would be to post up copies of the Fire Act and distribute copies of the same to parties with whom they came in contact, pointing out to them the provisions of the law and the terrible loss that might be entailed by their carelessness in the use of fire, that people might be educated to a sense of their responsibility, and that eventually sympathy would be enlisted and losses by fire materially lessened.

This fire-ranging system was first put in operation in the province of Ontario, and on a very small scale. It met with great success and approval, and ultimately the Dominion of Canada and all the provincial governments except that of British Columbia followed the lead of Ontario, as indeed did nearly all the states of the Union with very few exceptions, until it came about that the system inaugurated in Ontario has spread over the whole North American continent, with the result that a marvellous decrease has taken place in the destruction of timber by forest fires.

In addition to preserving the forest from destruction by fire, there was borne in mind the necessity for preserving the equable flow of the great rivers. We hoped to impress upon the various governments the necessity of preserving the watersheds from denudation. I need not amplify for you the dreadful things that occur in a country where the headwaters of a large river are denuded of timber. You know the floods and torrents that occur instead of the regular flow of water which exists when the heads of the streams are kept covered with forest growth.

Then there was the desire to protect the denizens of the forest, the game and birds. It would be a sad day indeed for us if the animal and bird life of the Canadian forests were destroyed. There is nothing that affords man greater pleasure or excitement than to see in the forest some of the larger of the wild animals. Even the squirrel calls up a spirit of humour when we see him running about enjoying himself to the very full. Then consider the beauties of the Canadian forest. I do not know what experience of forest life some of you gentlemen may have had, but in my youth I played Indian for several years. The forest was my home winter and summer, and to this day, and at any hour of the day, I can lay my memory tribute for scenes that make me long to be lost once more to civilization, a stranger to worry, to work and to noise. When I call up the scenes I have witnessed as I floated in a bark canoe along myriad streams and lakes innumerable, their shores clothed in living green from the highest hills to the waters' marge, not a scar or mark of fire visible, the whole landscape absolutely perfect, wholly quiet, and inexpressibly lovely, just as it came from nature's hands, one of the most beautiful of nature's beautiful works, and then think of the dread probability of this earthly paradise being blotted out and burned into a blackened waste by the carelessness or folly, or worse, of man, I am stirred to my innermost depths with the desire to prevent such sacrilege, and I have motive enough, putting everything else aside, to enlist me in the cause of forest preservation.

Protection from forest fires is one of the most important matters looking in the direction of the preservation of the timber, but it is by no means the only one. Another is the prevention of settlement or squatting on lands, which are rough and unsuitable for farming, but which have valuable timber growing upon them. Frankly, there is no more difficult question in connection with the administration of the Crown

lands in Ontario than this, because it not only raises the question of the protection of timber on Crown lands, but the more difficult one of the relations between the timber licensees and the settlers.

In the old days the only timber that had any great value to the licensees was the pine, and as we kept settlers out of the pine territory the lumbermen were fairly well satisfied. Now, however, the position is changed. Almost every tree that grows in our forests has taken on a value, and consequently the settler is anxious to get hold of a lot from which he may realize $300, $400 or $500 for the timber, to assist him in making a start on his farm. If settlers were always bona fide in their intentions it would not be so bad, but in many cases the desire appears to be to get hold of the timber and dispose of it without any intention of making a permanent home. While we have been exercising great care in connection with this aspect of affairs, we have not been able to completely satisfy either the settlers or the lumbermen, and I suppose it would be considered by some that this is an evidence that we have been doing what is pretty nearly right.

It seems to me that there ought to be some attempt made to draw a line between where the lands are unsuitable for settlement and it is impossible to carry on successful farming, or build up a farming district, and the lands that are suitable for farming purposes, and to say, and stand firmly there, that we will not allow settlers to go on lands that are not suitable for agricultural purposes. It is a mistaken kindness to allow settlers to go into a country where they cannot hope to succeed as farmers, but can only eke out a living for a few years by selling the timber, after which they remove to some place else, leaving the debris on the ground behind them. I think it would be a proper thing for this association to pass a resolution upon this matter, so as to again bring it to the attention of the governments, that the question might be considered by them.

Then I wish to say something about the danger to the forests incident to railway construction. This matter was referred to in the report of the board of directors, and properly so, because we are about to build another transcontinental railway, which will run through the forest for a long distance in the provinces of Ontario and Quebec. We in Ontario have been building a railway from Lake Nipissing to Lake Temiscaming, which is intended to be extended farther north until it joins the Grand Trunk Pacific. The Canadian Pacific Company has been building a branch line from a point near Sudbury down south through the Crown lands of Ontario to Byng Inlet. In order to secure supervision and protection where railway construction is going on, we have required, in Ontario, that any railway company building a line, as soon as they commence the work of construction, must put on fire rangers, and we, that is the Crown Lands Department, are to say how many rangers are to be put on and appoint or remove them if they are not doing their work properly, but the railway company has to pay their time and expenses. The Canadian Pacific Railway cheerfully acceded to these regulations, and we have had men upon their line of construction during the past year, whose services were paid for by the railway. When the Grand Trunk Pacific commences to be built, so far as it runs through the province of Ontario, and I think from the policy of the Dominion government, in other parts of Canada, an efficient system of fire-ranging will be put in force along that line, so that

ample protection against fire may be given—indeed we shall insist upon this. Mr. Joly de Lotbinière will remember that last year we had some discussion upon this question of railways. Now, I want to say for his information than upon the Temiscaming and Northern Ontario Railway we have tried the experiment of supplying our fire rangers with velocipedes. We place the rangers six miles apart, with instructions to follow each train through their section on the velocipedes, particularly the construction trains, so as to prevent the possibility of fires caused by sparks thrown by the locomotives or from coal dropping from the ash pans attaining any serious proportions. I think if a similar policy is pursued on the Grand Trunk Pacific, and other railways running through the rear parts of the province, the result will be as satisfactory as it has been on the Temiscaming and Northern Ontario road, where last year we did not lose $10 worth of timber, although the road was being constructed through one of the best pineries of the province.

I need not pursue in detail the different questions with which we have to deal. Taken as a whole the great object of the existence of this society has been to educate the people in connection with the protection of the forest wealth of our country. One great means of doing so is by having gentlemen of experience, and experts in their various lines of business, read papers at meetings of this institution. I am not speaking particularly of scientific men, but of lumbermen who know the practical difficulties and other gentlemen who have given the subject of forest preservation careful attention. Then we have discussions on these papers, as I hope we shall have upon papers read at this meeting, and by the publication of the proceedings of this society in which the papers read and the discussions upon them will be found, we hope to create a public sentiment which will assist the governments in taking an intelligent care of the forest wealth of the country. In the early history of this association some lumbermen had the idea that it was a society of faddists bound upon advancing their ideas, which were regarded as wholly impracticable, and merely intended to be talked about. This, of course, was a mistaken view, and we have won our way against this opinion, until to-day we are able to say that some of the most prominent lumbermen in the country are members of this association, and are assisting us in every possible way to build up a sound public opinion upon this whole question.

The question of the creation of large forest reserves is another matter that has engaged our attention. This is a policy that must commend itself to every government having large areas of public lands, sections of which are suitable for nothing but the growing of timber. It is a policy which has commended itself to most of the provincial governments, and indeed to the Dominion government. In Ontario, British Columbia, Quebec and the North-west there has been set apart already as forest reserves nearly nineteen million acres of land. In the province of Ontario we have set apart some seven million acres. In the province of Manitoba, I understand, there are three and a half million acres. In British Columbia there are six hundred and twenty-four thousand acres. In Quebec, one million seven hundred thousand acres. In all, as I said, there are somewhere between eighteen million and nineteen million acres, which have been set apart absolutely as forest reserves from which it is intended to exclude settlement. It is not the intention to exclude the public altogether, because we wish to make these reserves, under proper restrictions, play grounds for the people, as well as to protect and conserve the timber growing upon them.

Another question is that of reforestation. This is a matter which does not appeal very strongly to the average man in Canada. We seem to have such an illimitable area of forest in this country that it has been thought we can never get rid of our timber, and the idea has been that there is no necessity to bother with reforestation. In my early days in the back country the trees were regarded as the enemies, if I may so put it, of the settler, who made war upon them, cut them down and burned them up, so that he might clear his land and grow crops. This feeling still prevails in the rear parts of the country. In the early days I speak of, the timber other than pine had no value, and the only thing to be done with it by the settlers was to burn it up and get it out of the way. Now every kind of timber, owing to railway construction and the development of pulp and paper industries, has a value, and settlers are able to sell their timber other than pine for sufficient to start them out in a good way on their farms, instead of burning it up as they used to do. The fact remains that reforestation has not as yet taken any great hold upon the people of this country. I suppose we may expect to see something done in this direction later on. At the present time, beyond what has been done in the School of Agriculture at Guelph in connection with the growing of young trees which may be distributed to the farmers and others who desire to replant, we cannot point to any progress.

As one of the representatives of this association who attended the recent meeting of the American Forestry Association at Washington, I desire to say that I never was more pleased in my life than I was to see the magnificent meeting held there. The President of the United States we found to be one of the most active supporters of a forest policy. He was kind enough to come down to one of the theatres and address the association for an hour or more upon the subject of 'The Forest Wealth of the Nation,' and I never listened to a more forcible exposition of that question than I had the pleasure of hearing from that eminent man upon that occasion. From some of the President's remarks I found that they had the same classes of questions to deal with that we have in this country, and he was very strong and outspoken upon the question of people taking up lands merely for the purpose of skinning the timber, and said he was against that class all day and every day. It was only in the city of Washington, and under the circumstances that prevailed there, that we could have had such able and representative men present. The head of the American Forestry Bureau, Mr. Pinchot, perhaps the strongest man in forestry matters on the continent, did everything he could to make the meeting a success and was backed up and supported by the influence of the President. The government brought their experts from their different forest reserves. We had the engineers of the most important railways, mining experts, men interested in irrigation—almost every interest that has to do with the use or growth of timber was represented at this meeting, and the views of the varied interests were voiced by able papers read by practical and representative men. It was, taking it altogether, the most instructive meeting I ever attended, and I think a great deal of good will flow from it as far as the United States is concerned, and the inspiration given us who were there from Canada was, on our return home, to endeavour to create a strong sentiment in this country along the lines advocated at that meeting, and if possible to bring about a meeting on similar lines in the Dominion of Canada.

I have about covered the ground that I intended, but before I sit down I wish to say that while we are here as business men for the transaction of business we ought not to forget the friendships we have formed, many of which will endure for our lives. This being so, we cannot but regret when any of those with whom we have been associated at meetings of this kind are called away. During the last year this association has sustained a tremendous loss by the death of Mr. John Bertram. Mr. Bertram did not need to concern himself with anything except the cutting of his timber and the marketing of it. He had good limits, remote from settlement, and indeed everything that went to make up a successful lumbering property. He was a practical lumberman; he was indeed a strong man, well armed, but being a public spirited man of immense intelligence he chose to interest himself in forestry. He was a regular attendant at our meetings, and by his wise counsel assisted the work of this association. There was no man in all our body who was better equipped as a member of such an association. Those of you who were present at the last meeting will remember a litttle by-play that took place just at the close of the meeting between Mr. Bertram and myself. He objected to re-electing men who had already served as president, and talked about us 'old fellows.' I said, 'Speak for yourself; I do not admit that I am an old fellow.' He said, 'I feel as young as you do.' Since then, to our great sorrow, he has been removed by death, and we shall see his face no more. He was, above all things, a representative Canadian, a man who loved his country, and who was determined to assert his country's rights in every particular. It was perhaps more owing to his exertions than to the exertions of any other half dozen men that the province of Ontario determined that its sawlogs should not go out to feed mills in the United States. If Mr. Bertram had never done anything but that, he would have left an enduring mark upon the history of matters pertaining to the forests of this country.

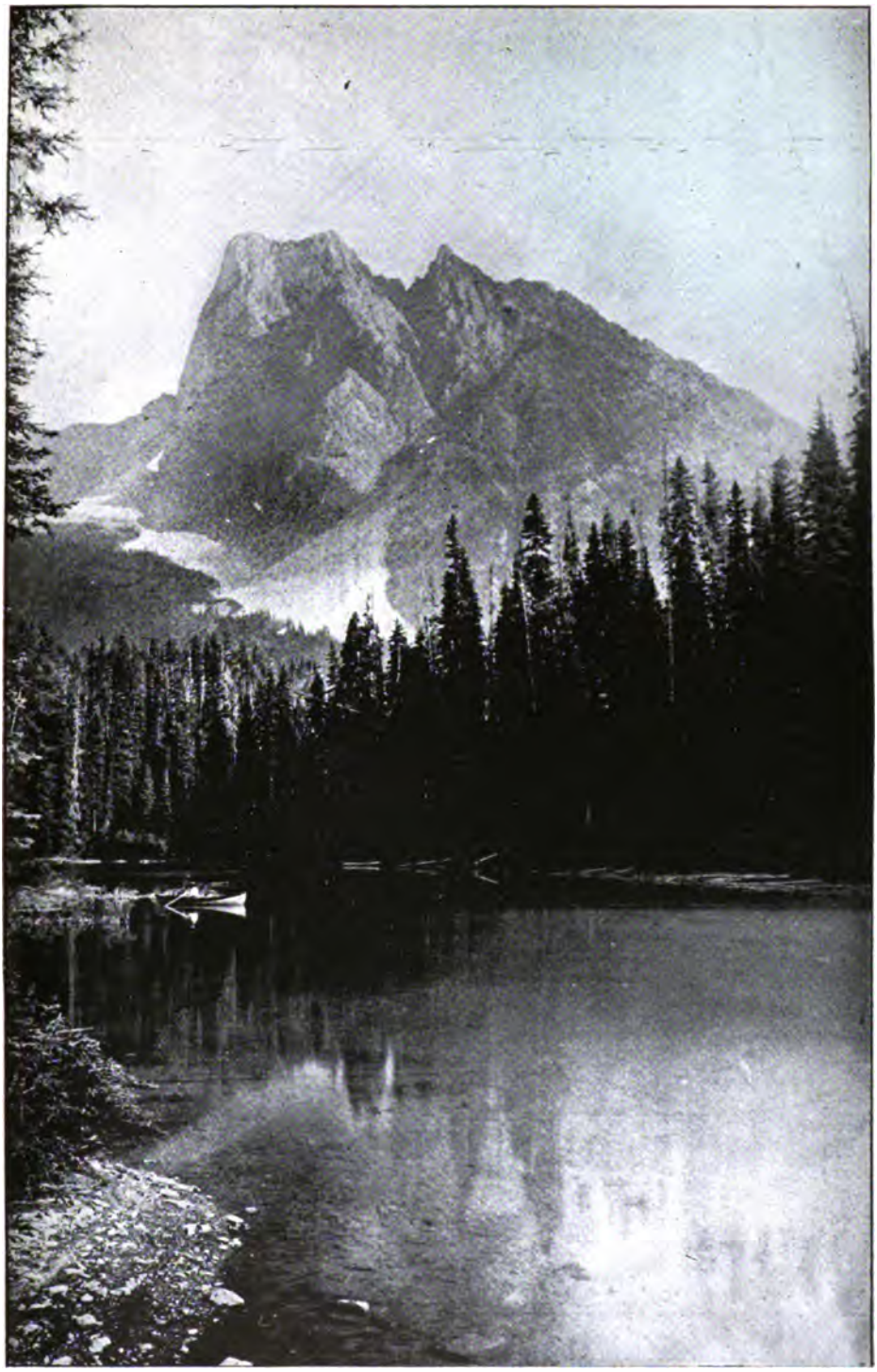
Then we have also lost Prof. Muldrew, who was a well-read man of unquestioned ability on matters connected with forestry. He had gone to the Guelph school to take up forestry matters there. He was cut down suddenly in the very prime of life.

Col. Higginson, I did not have the pleasure of knowing so well, but he was an estimable gentleman, taking a great interest in forestry matters. There is just one other man who has been called away whose death was a great loss to this association and to myself personally, because he was one of the closest friends I had, and I think one of the most upright, honest men that ever lived. I refer to the late W. C. Caldwell, who represented the county of Lanark for many years. Straight and upright in every respect, one cannot think of him without believing that the country was the better for his having lived.

Then we must all regret the affliction that has come to our honoured president, Sir Henri Joly de Lotbinière and his family in the death of Lady Joly. We all love Sir Henri, and we believe that his name will be remembered for the good work he has done as long as trees grow in this country. He has our sincere sympathy in the affliction that has befallen him.

Gentlemen, my remarks have been somewhat disjointed. I have tried to speak to you of the different interests of the association, and what we are hoping to do. Before I conclude I wish to express the hope that the good work that we have brought to

CEDAR TREES (*Thuya Gigantea*) IN STANLEY PARK, VANCOUVER, B.C. [16
(By permission of the Superintendent of Forestry.)



BURGESS MOUNTAIN, EMERALD LAKE, ROCKY MOUNTAINS. [16

life will not be allowed to die, but on the contrary be largely extended. Every exertion ought to be made to enlarge our membership. We have only some 600 members, whereas in this great Dominion, considering the objects we have in view, we ought to have a membership of as many thousands. The way to enlarge our membership is for every one of us to exert himself with our friends and acquaintances and endeavour to induce them to become members. If this is done, I hope by the time of our next meeting we shall have three or four times the membership we have at present.

In the absence of Professor R. W. Brock, of Queen's University, Kingston, the paper prepared by him on 'Forest Fires in British Columbia' was read by Roland D. Craig, of the Dominion Forestry Branch.

FOREST FIRES IN BRITISH COLUMBIA.

PROFESSOR R. W. BROCK, QUEEN'S UNIVERSITY, KINGSTON, ONT.

I appreciate very highly the honour conferred upon me by the Forestry Association in inviting me to attend the annual meeting at Quebec, and to present a paper on forest fires in British Columbia. It is with regret that I find it impossible to do either. I should have liked to have contributed my mite toward furthering the good work of this association and to have assisted in emphasizing the seriousness of the question of forest fires. It is a subject important in all our forest areas, but particularly so in British Columbia, for here the forest represents such a large public asset, and the natural conditions render it so liable to destructive fires.

Much as I would have liked to have given this subject adequate treatment, and to have taken part in its discussion, stress of other work compels me to confine myself to a few random notes.

Any one travelling through the province is at once struck by the beauty and value of the timber, and no less by the terrible havoc wrought upon it by forest fires. British Columbia consists of a belt of alpine country, in the centre of which is a relatively narrow strip of dissected plateau-like country. The province as a whole may be said to be forest-clad, but the growth of trees is more luxuriant on the western slopes of the mountain ranges, and the interior plateau contains wide stretches of open grass-covered hills and valleys. The higher mountain ranges rise above the tree line and merchantable timber is confined to the valleys and up the mountain sides to a limited height. Many of the smaller valleys are too steep and narrow to furnish valuable timber or much of any kind.

In any country where nature deals bountifully in respect to a product we are very apt to consider such natural wealth inexhaustible, but it is unnecessary here to call attention to the fact that forest wealth is in the strictest sense limited. While British Columbia has in the aggregate a vast supply of timber, it is apparent when one considers the inroads that will be made upon it with the increased markets of the future that she can ill afford to pay the heavy, almost annual tax levied by the forest fire.

To make matters worse, on account of the rugged, mountainous character of the country, the only timber that is available and that has an immediate market value is that which is near transportation, and for the same reason a great deal of such transportation must be along artificial lines, that are necessarily very slowly developed, yet it is in precisely such localities, near transportation, that the bulk of the fires rage. I have not figures to show what percentage of such favourably located timber is actually destroyed and what percentage actually harvested, but I do know that the percentage lost must be appallingly large, and that unless active steps are taken to prevent this destruction only a relatively small amount of the timber now standing will ever reach the market.

The natural conditions are favourable for fires. The interior plateau is a notably dry belt, and during the long summer months everything is dried to the inflammability of kindling. Over a large area of British Columbia the precipitation is erratic. Several wet summers induce a luxuriant growth of vegetation, including a rich growth of moss. Then comes a dry season, when for perhaps three months the strong British Columbia sun scorches uninterruptedly, drying the whole undergrowth and moss to tinder. A large proportion of the forest growth is resinous. The configuration of the country and the regular air currents create a powerful and most effective draught. There is, however, one good feature, the fire is usually confined to the valley or mountain slope on which it starts, though if there be a low pass at the head of the valley

it may cross over to the opposite slope. The burnt areas are therefore usually restricted in dimensions, but on the other hand they are discouragingly numerous. So numerous are the fires in a dry season that the whole countryside may be buried under a dense pall of smoke. Last summer in the Lardeau-Duncan district, where I was engaged in field work, no topographical work could be done during the whole of August and September. Often objects, no matter how large, were invisible a hundred yards away.

The extent of the damage done to the timber by fires varies. Occasionally a fire may burn out the underbrush without absolutely destroying the timber, and such standing timber may remain sound for years. The Cascade river, near Banff, was swept by fire twenty-five years ago. Some of the burnt timber is still standing, but most is now down. Professor J. C. Gwillim informs me that it is still so sound as to be used for timbering the coal mines. Dr. G. M. Dawson, in 1886, speaks of the upper valley of the south fork of Sheep creek being a desolation of bleached fire-killed timber. In 1904 some of this was still standing, and a large amount sound.

In a dry season like last the fire is apt to consume everything. Last summer I climbed up a hillside through fine green timber, and about a week later came down the same place wading knee-deep in ashes. Not a vestige of anything combustible on or in the soil had been left. The hillside was as bare as the bottom of an alkali pond. I ran across several fires that had been equally thorough.

When a fire gets well under way only a protracted wet spell will stop it. So long as the interior of rotten logs and the roots remain dry it will smoulder until conditions are once more favourable, when it will again break forth.

CAUSES.

Not all the fires originate through human agency. Electric storms are an important source. In 1903 during one thunderstorm I saw through the door of the tent four fires start, and altogether from the camp I counted eight. Fortunately this storm was succeeded by several days of heavy rain, so that little damage was done. Electric storms unaccompanied by rain are not unknown in the high mountains during the dry season. One summer we had to strike camp and rush for safety from a fire which suddenly and without warning was started by an electric discharge from a clear sky, and which rapidly enveloped the whole mountain side. I have frequently seen traces of such fires. So far as my observations go, such storms are usually confined to the higher altitudes. Here the timber is isolated in groves, so that such fires do not usually become large.

The greater number of the destructive fires are started by human agencies. If any proof of this were needed it would be furnished by the fact that on the whole the forest matures and is preserved until man—white man and his retinue—gets into a district, and then the destruction greatly exceeds the natural recuperative powers of the forest.

Most of the fires started by man are not accidental, but the result of gross, often wilful, carelessness, and not a few of deliberate intent. In dry seasons, when the grass and moss are like tinder, a match thrown down, especially a wax one, is a source of danger. Camp fires even when extinguished with water may still smoulder in rotten logs, mould or roots, and eventually break forth.

Smudges built for horses during the fly season are a more fruitful source of fires, for they are generally built large, so as to require little attention, and to accommodate a large bunch of animals. An increase or change in the wind during the day may start a fire that before it receives attention is quite beyond control. It is of course during the dry season that such smudges are required. In 1902 I came upon a very destructive fire in the Boundary district that had originated in this way. The same season, from the top of a mountain on which we were taking a survey station, we saw a spark from a locomotive start a fire in the dry grass. Shortly after the section gang passed it on their way home. In five minutes they could have put it out.

Two days after all the men available were out trying to prevent this fire from burning the railway trestles, even the men from the mines having to be turned over to this task. A number of fires are raised in this way.

DELIBERATE FIRING.

Fire is wholly used for clearing land for buildings, ranches, railway and other rights of way, and these fires are often set at the time when the least possible amount of labour will be entailed—that is to say, right through the dry season. Were it necessary I could give instances of fires started in this way down to the end of last season, but since so many companies and individuals have sinned in this manner, there is no need to particularize. Such fires are not primarily intended to destroy large areas of forest, though it seems to be a matter of little concern if they do, but I am convinced that fires are started by individuals with the express purpose of clearing the timber off large areas in order to facilitate prospecting. This mode of deforestation is quite generally approved of by those interested in the discovery of minerals. I have learned this from widespread intercourse with such individuals, who are convinced that the end justifies the means. Last summer when we first observed the smoke of forest fires, a man remarked to me that he knew where the first fire would be, and sure enough that was one of the first. It is needless to say it was a locality where there was reason to believe good prospects could be located. Of the score or more fires which came under my notice last summer, I don't suppose that more than a couple were located where I did not know that it was desired to have the ground laid bare. When the general opinion is not hostile to such action, it must be regarded as more than a coincidence that the fires should clear just the ground that is supposed to be mineralized. I do not mean to say that in every case the fires were deliberately set, but such views tend to carelessness and prevent whole-hearted efforts at extinction.

When a fire is burning in the vicinity, back-fires are often set with the alleged purpose of checking the fire in a particular direction. It may happen that these back-fires make desired clearings, and also that they become more destructive than the original fire. It is not alone the lumbering industry that suffers. Many of the low-grade mines, and in British Columbia these will probably out-number the high-grade, can only be worked if costs are low, and timber is one of the important items of cost. A forest of timber goes into a large mine. If the timber cannot be obtained cheaply, that is, near the mine, it might be that the mine could not be worked. It is where mines are or will be that men are, and it is where men are that the bulk of the fires are; so that the destruction of timber by fires is a serious matter for the mining industry. The damage to property by these fires is also great. The prospectors lose their cabins and prospecting outfits—to them a very serious matter. Mines lose their buildings, surface plants and tramways, and until they can be replaced production is at a standstill. Whole towns are threatened and sometimes destroyed, and life itself is endangered. Thus the losses occasioned by fires affect directly and indirectly all industries and all classes of people. Yet the worst obstacle in curtailing this destruction is the inertia of an apathetic public. In whatever steps that may be taken to lessen this fire evil, the education of the public to the seriousness of the question should receive a foremost place. One of the quickest ways of doing this, it seems to me, would be to make the laws regarding fires more stringent, and to see that they are rigidly enforced. To set a fire deliberately or through wanton carelessness should be a penitentiary offence, just as any other form of wilful fire-raising. To burn down a public building in order to let more sunlight into your back garden would be arson, but it would be quite as defensible and probably as innocuous an act to raise a forest fire to aid your prospecting. It is true that notices regarding forest fires and penalties for causing them are pretty generally posted throughout the fire districts, but these laws are not enforced. I have seen a number of cases in which the responsibility for the fires could be placed, but I do not know of any one having been prosecuted in connection therewith.

It should often be an easy task to fix the responsibility for the fire on the guilty party. Without any special attempt to get at the facts, we often discover the causes of the fires we happen on, or at least promising clues. An officer who is a good woodsman and whose time is devoted to this special work should not experience much difficulty, provided he did not have to cover too great a territory. Active fire rangers should be able to do effective work. By climbing a good look-out mountain one can survey a vast stretch of country and detect fires in their incipient stages, when they can be successfully fought and checked, and when their origin is easily detected.

Locomotives should be provided with spark arresters, and section men should be compelled to immediately put out fires near the railroad.

At present one of the most serious handicaps in combating the fires is lack of any organization. It seems to be nobody's business to put out fires. Only when artificial property is threatened is any attempt made to check the progress of a fire. Last summer a fire sprang up near a town whose population was engaged in waiting for capitalists. Nobody thought of doing anything till the fire was about to enter the town.

If the laws were made more stringent, and officers were specially commissioned to rigidly enforce them and to organize for fire-fighting, I do not think a great time would elapse till the public actively co-operated, for the standard of intelligence is very high, and the western public is quick to realize and to act. The cost of protective measures should not be excessive, nor should it be any barrier when so much is at stake. The only districts that need to be covered are those where men are. The lone woodsman is seldom the cause of a fire. In wet years no protection is required. If this association will stir up the government to vigourous action, and engage in educating the British Columbia public to a sense of the value of the timber as a public asset, and of the enormous losses sustained through fires and in methods of limiting these, then it will have conferred on British Columbia and upon the country at large a great and lasting benefit.

Mr. LEAMY.—Mr. President and gentlemen: I am not a politician, nor am I accustomed to speaking before large assemblages of people, so I am afraid that I will have to ask your indulgence if I do not explain myself as clearly as I might. As you have been told already, I am Dominion Crown timber agent for the province of British Columbia, and am also in charge of the fire ranging in that province. The portion of the province under my control comprises an area of about twenty thousand square miles, and in that area we employ usually eight men as fire rangers. It is a very easy matter for you to see at once that it is quite an undertaking for eight men to cover this amount of ground, but as it was merely a trial or experience at first, we did not go to any great expense until we could see how it was likely to work. We did not in fact have anything to go on, and we did not know whether the experiment would be successful or not, and consequently did not feel justified in incurring any great outlay until we could ascertain the probable result of our proposed system. The first season of the fire rangers was largely occupied by them in endeavouring to educate the people as to the value of the timber, and preventing at the same time, as much as possible, the occurrence of any fire. As any woodsman knows, once a fire gets properly started in the woods it is almost impossible to control it, and so we have been acting on the old saying, 'an ounce of prevention is better than a pound of cure,' and have always tried to stop the fires before they could get under much headway. One of the duties of the fire rangers is to ascertain when prospecting parties are going to prospect the forest ranges where they suppose minerals are to be found. Now, the usual practice of these people is to set fire in the locality in which they wish to pros-

pect and burn it as bare as possible. This is not done in the railway belt of British Columbia to-day. Our rangers follow each prospecting party; they know the towns where they outfit, and they follow them quite a long way, and inform them as to their liability should a fire occur in the district in which they are about to prospect, and in addition to this precaution serve upon them notices containing a copy of the Fire Act and its penalties. This step no doubt prevents the outbreak of numerous forest fires.

The next trouble that we have to contend with is the settler. I am sorry to have to say it, but the settler is a source of trouble, and has been the cause of very many fires in our forests. He wants to get what is called 'a clean burn,' and with this idea in his head, slashes down the timber, and after he has cut it down does not gather it up in any way, nor pile it, neither does he make any endeavour to prevent the fire from spreading beyond the actual area of his clearing. He simply sets fire to it and lets it go. Up to two years ago they used to set fire in this manner, and after they had burned about a thousand acres or so, thought it would be a good thing for me to send men to put out the fire, and would send me a request to this effect. They were beginning to get alarmed as to the extent to which the fire might spread.

As has also been mentioned in the last paper read here, there is the difficulty in getting a magistrate to fine any man committing such an offence who happens to be his neighbour. The Fire Act in the province of British Columbia, which creates the fire district and which calls the whole province a fire district, says that any person guilty of the offence of setting fire in the woods and not looking after it is liable to a fine of not less than $50 and not more than $200. Now, on one occasion, in my jurisdiction, the fire ranger brought up a man before one of our magistrates—and incidentally I would have you remember that the accused had been complained of by his neighbours, not by the lumbermen, the neighbours asserting that their property, fences, barns, and even their lives were in danger. I may as well add also that the man was not a Canadian, but a Swede. And it was proven that he had repeatedly set fire to his own place and to the adjoining forest, which contained very valuable timber. He had been warned repeatedly by the fire ranger, who at last realized that argument was useless, and had him arrested and brought before the magistrate. There he was found guilty of the offence charged against him, after seventeen of the neighbours had been brought in as witnesses, and I can tell you that it is an item of considerable expense to bring a man twenty or thirty miles out of the woods to give evidence in cases like this. Well, the offence was proven, as clearly as it is possible to prove anything in the world, and how much do you suppose the magistrate fined the man? Ten dollars. This is what they call carrying out the law. The law distinctly says that the minimum fine shall be $50. I must say that I cannot see how the magistrate could possibly bring this to mean that he could fine him $10 if he chose. The fire ranger asked the magistrate to point out the section in the Fire Act on which he relied when imposing the fine, and what reason he had for not fining the man at least the lowest amount prescribed by law, and his answer was, 'Oh, well, the man is poor, you know.' It would have been cheaper to have hoisted that man out and got him to leave the country. It would be better for a lumber-growing country that such a man should not be allowed to live in it.

Previous to the establishment of a fire-ranging system in our province, this practice of setting out fire indiscriminately was commonly indulged in, and although there was a Fire Act under which it constituted an offence so to do, little or no effort was made to enforce the provisions of the Act. Mr. Stewart, the Dominion superintendent of forestry, is entitled to the thanks of the people of British Columbia for the inauguration of the present system of forest fire ranging, and for bringing the system into its present state of efficiency.

Outside of the railway belt there are large areas of land which contain more timber than can be computed and which is not guarded at all. Prior to August of last year, I think I might say without exaggeration that there were one hundred miles of timber on fire, and nobody looking after it at all. Until the past few years the settlers did not look upon their timber as being of much value; in fact most of them looked upon it as being of no value at all. I am pleased, however, to be able to say that of late years they have come to look at it in a very different light, and are gradually being educated to the fact that their timber is a very valuable asset. Knowing this, they are not nearly as liable to set fire to it. Formerly they would just go in and burn the place clear, for the purpose of so-called cultivation. In the most of the places so cleared, if you wanted to sow anything you would have to shoot the seed into the ground with a rifle, it being in many cases steep side hills.

Reforestation, however, is taking place in such a manner that you would hardly believe it without seeing it for yourself. The whole country is covered with a crop of young cedar, spruce and hemlock (which latter is good timber out in our district, almost as useful as fir); it is all cropped over, and you can go up into the Shuswap Lake district and see four or five hundred square miles of land on which this reproduction is taking place. The Shuswap is a very large lake, having, I suppose, three or four hundred miles of coast line, with but poor means of ingress or egress, so that if settled upon there would be very great difficulty in getting out the produce after it had been raised there. In spite of this, the settlers want to get in there and settle on this land, and I hold that the government should not allow them to do this. This sort of land is not valuable as agricultural land, but it is very valuable for the new growth of timber that is upon it, and should be conserved for such purpose. This district was burned over some twenty-four or five years ago, and I know that the gentlemen here from British Columbia will bear me out when I say that it is very densely covered with a new growth of timber, a repetition of the former covering, which would at present average from twenty to forty feet in height and eight or ten inches in diameter at the stump. Twenty years hence this will be a very valuable asset in the wealth of the province, and there will be a great many million feet of merchantable timber available there. Such places as these should be set aside, as has already been recommended to the department at Ottawa, and I am of the opinion that a further recommendation from this association would help in this direction.

I made the statement once and I think that Mr. Stewart will bear me out if I venture to make it again; it is that I consider that over a million feet of timber was burned in the province of British Columbia, in order to enable one man to clear a quarter of an acre, to sow some potatoes on the place he had so cleared, and he never planted the potatoes at all.

A voice.—How much did he burn?

Mr. LEAMY.—A million feet; well, perhaps I should not say as much as a million feet, I do not want to exaggerate, but it is a fact just the same that many people have destroyed the timber in clearing their land and afterwards made no use of the land.

I have brought a couple of photographs with me which I would like the members of the association to see. They will give them some idea of what these people have to contend with in clearing their land and what they will destroy in order to get a few acres of agricultural land.

As I have a couple of friends with me here from British Columbia, I will not take up any more of your time. I did not have an opportunity to prepare anything which I might present to you in a readable form; perhaps my friends from British Columbia would like to say a few words to you; they know all about the subject and are representatives of two of the largest lumber firms in the province. Possibly you might be interested to hear their views as to the efficacy of the fire ranging system which is now in force in the province and the good it has accomplished.

Before closing, I wish to tell you that when I asked the mill-owners if they would consider the question of establishing fire rangers and paying one-half of the expense, they immediately said, 'Certainly we want the fire rangers; we are willing to try anything to save the timber.' The mill-owners have a large amount of capital invested and I think that when business men will talk in this emphatic manner it means something. I have to thank these gentlemen for their very able assistance in carrying out the details of the fire-ranging system in British Columbia.

There is just one other point and it is that I would like to see the magistrates do their duty; I will do mine as far as I am able but if I am not assisted by those entrusted with the administration of the law, I can accomplish but little on my own account towards preserving the timber in the railway belt of British Columbia.

Hon. Mr. BOSTOCK.—I am very pleased to see here to-day so many representatives from the different provinces, and particularly from the province of British Columbia. I am sure it is a great source of satisfaction to them, as it is to myself, to be able to get here in time so that they might be able to attend this meeting, because I have found since I have become a member of the association that there is always considerable difficulty in getting gentlemen from British Columbia to join the association, because they say it is difficult to attend the meetings. Up to this time I must confess it has been a source of some difficulty owing to the impossibility of arranging anything in the way of transportation, but, I wish to congratulate the secretary of this association on having been able to arrange with the railways this year to grant us better terms, and so induce us to come down and attend the meeting.

I have listened with a great deal of pleasure to what has been said, and I want to compliment Mr. Leamy on his statement of the work he has done in British Columbia. I consider that he has carried out the work in the most satisfactory manner, but I am sorry that he is confined to such a very small section of the province.

Of course, as the map shows, his district is large, but if you saw it in comparison with a map of the province of British Columbia you would at once agree with me that his district is but a small portion of the province.

BRITISH COLUMBIA LUMBER WOODS, SHOWING LOG ROAD.

(By permission of the Superintendent of Forestry.)

Mr. JONES.—There are about twenty thousand square miles in the railway belt, and I think the area of the province is about six hundred and eighty-one thousand square miles.

Mr. BOSTOCK.—You can judge from that, gentlemen, as to the comparative sizes. Mr. Leamy's work is very excellent, but it is confined to such a small portion of the province. It is very much to be regretted that he cannot be allowed to continue his good work outside of the railway belt.

One of his greatest troubles at the present time is the fact that the provincial government, so far, has not been stirred up to the necessity of protecting the forest. The fires that occur in the railway belt occur very largely through being started outside of the belt, and there is no ranger appointed to look after them there, and no interest is taken in the matter.

Then there is another point on which I agree with Mr. Leamy. He says that the magistrates are not accustomed to enforce the penalties. They do not consider it their duty to look after the forest so much as to look after the pocket of the settler, and consequently the amount of damage that is done by fire outside the railway belt is very great indeed.

This question of fining the settlers and keeping them off land on which they are really not able to make a living is one which is coming before us more and more every day, and I hope that a very strong representation will be made by this association, as a body, both to the Dominion government and to the provincial government that they should take steps to have the land properly looked after, and appoint capable men to make a report to the agents both in the province and in the Dominion; to take the entries from the settlers and make reports to those men, showing whether the land is fit for settlement or whether it is not.

At the present time this question is left in the hands of the agents to decide whether a man shall settle in a certain place or not. As a rule the agent is a man tied down to his office, and who cannot afford the time to go out around the country and see the particular land which the settler wants to open up, and consequently he is not in a position to say whether the land is fit for settlement or whether it is not.

The consequence of this is that there is a great deal of land taken up by these settlers which is absolutely unfitted for them to make a living out of.

Then, if we could get proper forest reserves established, and notify the agents that nobody is to be allowed to settle in them, it would be a great help in preserving those valuable assets of the country, the trees, and in the future we would be in a very much better position than we are to-day.

Another cause of fires touched upon by Mr. Leamy was the miners. I think a good method to remedy that evil would be to put upon every license issued to miners a clause to the effect that if they were caught starting a fire in the timber their license would be confiscated, and they would not be allowed to get another for a certain number of years. There is no doubt a great deal of damage is done in this manner, that is, by men who want to clear the land for the purpose of prospecting.

There is also the very delicate question of the Indians. This is a very difficult question to deal with, no matter what way you look at it. The Indians have been in the country a great many years, and it is hard to teach them that they cannot do as they have done in the past, and as their forefathers did for hundreds of years. But, I think if they were trained as children in the schools, and were made to understand the value of taking care of the forests, a great deal could be done with them, and that the result would be that they would be more careful to put out any fires they made when travelling through the woods. They could be taught that instead of leaving their fires to smoulder after they are through with them, it is a simple matter to take a little earth and put it on the fire and put it out entirely and absolutely.

If this could be done (and there is no doubt that it can) a great deal of damage would be prevented, and we would be taking a practical means of preserving our forests, which are one of the greatest (if not the greatest) asset that we have in this country.

I will not take up your time any longer, because those two gentlemen from British Columbia, who are both practical lumbermen, may possibly have something to say which will be of interest. I will therefore not take up your time listening to me.

Mr. F. W. JONES.—Mr. Chairman and gentlemen, I am very glad indeed to have an opportunity to attend this meeting, and feel greatly honoured at being asked to say something on behalf of the British Columbia lumberman.

In the first place I think I ought to defend him from what may have been the inference from Mr. Bostock's remarks, that we have never been here before. The explanation of that is, as you will readily understand, it is a considerable distance, and when it comes to making a trip from the western portion of British Columbia to Quebec it is about as long a trip as you can make by rail anywhere on earth.

In addition to that, the lumber interest out in that part of the country is more or less in its infancy, and we have not made the lots of money that the lumbermen have made down in the older country, through the Ottawa valley for instance. There are no millionaires out there like you have down in this part of the world. We have been given to understand that the millionaires around here are mostly lumbermen. The case is different out in British Columbia, and the consequence is that heretofore we have not been able to get the time and money to attend those meetings.

Now that we have come here, I for one am very glad indeed to have an opportunity to add my testimony as to the efficiency and value of the fire-ranging system in the railway belt in British Columbia, so far as it has gone. The only thing that is wrong with it is that there is not enough of it.

A little bit is a good thing, no doubt, but what we want is more fire rangers. I do not know whether Mr. Leamy made it quite clear to those of you who are not familiar with the west just what the extent of that railway belt is. 'Railway belt' is a term that might possibly suggest railway land. Well, it is nothing of the kind. It is a belt of land twenty miles on each side of the main line of the Canadian Pacific Railway which, I believe, the province of British Columbia turned over to the Dominion government as a partial return for the building of the railway—a sort of a bonus

towards the job. The consequence is that for a distance of twenty miles on each side of the main line of the Canadian Pacific Railway the land is Dominion land, and administered from Ottawa, and entirely distinct from the whole of the rest of the province, which is administered from Victoria. The area of that railway belt is somewhere about twenty or twenty-five thousand square miles—it is about five hundred miles long by forty miles wide. Of that area some seven hundred miles are held by the company I represent, in the shape of timber limits. That is more than any other concern happens to hold in that railway belt, and we probably pay a little more towards the cost of those fire rangers than any other firm there.

This being the case, I want to say right now that if the government will double the number of fire rangers, or multiply it by three, and administer it in the same way, and use the same care in selecting the men, and give the same kind of expert supervision as they have had from Mr. Leamy, and such direction and advice as they have had from Mr. Stewart, our concern for one would be very glad to pay its proportion of the increased cost, and we believe that we will get a good many dollars' benefit for every dollar that we spend in that way.

I may tell you that before this system was established we had one fire in berth No. 17 by which we lost about two hundred million feet of timber. The fire was caused by a man, who we believed was a squatter. You understand that there are no farmers in British Columbia. Every man who has two hills of potatoes and a couple of blankets is a 'rancher.' That distinction is made out there because they do not like to be called farmers.

While on this question of squatters, it seems to me that the Dominion government ought to arrange this for us. It seems to me that we ought to get a license from the Dominion government which would show that we are entitled to the possession of the land in the meantime, and if ranchers squat on it the government ought to intervene and give us quiet possession of the land, and settle the matter as between the holder of the land and the squatter.

They say to us now, 'Take eviction proceedings and put those fellows off.' Now, eviction proceedings have never been popular in Ireland or anywhere else, and the lumbermen do not think it is their business to be called upon to take eviction proceedings against any one. If the government took hold of the matter and dealt with it in some practical way, then the ranchers would not have any hard feelings against the lumbermen; and at any rate it is the business of the government and not the business of the lumbermen.

That is a point that might be dealt with by this association, and the government might be asked to consider the matter. It seems to me that it is an important point, and falls in with one of the objects of this association, which is the preserving of the timber that we have, in addition to the growing of another supply.

While I am speaking of the growing of another supply of timber I would like to confirm what Mr. Leamy has said in reference to the second growth in the Shuswap lake district. This is also the case in the valley of the Columbia river, above Golden particularly.

The timber, as far as I have observed, is mostly jack pine, but that is a good merchantable timber. It makes good stuff for the farmer on the prairie, and that is what the timber is mostly used for there.

The trouble with the settler out there is about the same as it is here, except in that part of the country where we are operating we do not find that the settler has any use for the timber. His idea in going in is not to cut the timber that he has on his land for what it is worth, but to get the timber off so as to clear enough room for those two hills of potatoes and to put up his teepee, and probably plant a few apple trees.

A good deal of this land is of very fair quality, and it does not take a great many acres of it to make the kind of living that the 'rancher' in British Columbia is used to—whether it is what he requires or not. Those people are not only going into unoccupied Crown timber lands, but they are going on to the limits and squatting there.

If we clear half an acre for a camp there is some fellow waiting in the distance until we take the men out in order that he may jump in there and start a 'ranch.' Of course the regulations do not give him any right there. He cannot get a title to the place; he cannot borrow money on it or anything of that kind; but so long as it is the way it is now the Dominion land agent, or some of his people, let the man quietly understand after he is there that they will give him a title when the limit is worked out and abandoned. That is about the way the thing stands now. And he gets in there, and you cannot get him out without a lot of trouble.

There is another thing that I would like to mention, and that is the distinction which everybody could observe last year between the main line of the Canadian Pacific Railway, which is the railway belt, where there was a system of fire ranging, and the Crow's Nest line running out to West Kootenay, where there is no system of fire ranging. It is true that we had some fires on the main line, and some of them came our way owing to the prevailing wind from the south. There were three or four small fires in the valley of the Columbia river where we are operating. One of them on the spur between the Bluewater and the Blackwater would have done a great deal of harm if it had not been properly attended to by the fire rangers.

Many of these fires were started by settlers or people desiring to settle. The argument they use is this: 'Well, this is timber land, and if we set fire to it it is not fit any longer for timber land, and so it will be open for homestead.'

I want to say this, however, the Dominion government as represented out there has been distinctly active and liberal in the matter of extra assistance whenever it was required to cope with those fires. We had practically *carte blanche* to go to work there and fight those fires, and call out anybody that we think necessary, and the government will help us on the expense.

Those fires have done a great deal of harm in the past. There has been a great deal of timber burned. They burned for months, and there were hundreds of millions of feet of valuable standing timber burned. There were some people put out of business owing to their mills being burned down. It is to be hoped that there was an occasional 'rancher' put out of business too.

The difference is that on the main line there is a system of fire protection and on the other line there is none, and that difference is so marked that a man riding through both lines on the train and not being acquainted with the real reason would wonder whether it was not a warmer climate that was the cause of the difference, but those who know the country and the circumstances know perfectly well that the difference is due to this fire-ranging system.

Mr. JARDINE.—I am pleased indeed to have an opportunity to attend this meeting of the association. Had it not been for the fact that Mr. Jones and myself were in Ottawa on some other business we would not have had the pleasure of being with you to-day, and taking part in these proceedings.

I must say at once that I did not expect to be called upon to say anything. I merely came down as a sort of bodyguard to my friend Leamy.

I have much pleasure in adding my testimony to what has been said by the previous speakers in regard to the invaluable services that Mr. Leamy and his staff of fire rangers have rendered to the timber industry in what is called the 'twenty mile belt.' The firm with which I am connected has a certain area within this belt, but the greater part of their land is outside of it, in the province. I think the time is not far distant when the government of British Columbia and the legislators there will awake to the fact that the timber of the province is a valuable asset, and I believe the time is not far distant when we will have all over the province this system of fire ranging, which will look after the timber interests of the country.

As has already been said, there were some very large and serious fires last year along the coast. We, among others, suffered somewhat, but having a great number of men in our camps we were able to protect our timber to a certain extent, and as a result we did not lose as much as we otherwise would have lost.

I do not know that I can say anything more to you, gentlemen. The speakers who have preceded me have said it all, and there is nothing left for me to add.

We have a province out there of which the twenty mile belt is only a very small portion. I have heard it said that you could drop Ontario and the maritime provinces into the province of British Columbia, and that you would still have something left, and if it was rolled out you could turn Manitoba and the Territories into it. It is a vast area to cover, and no doubt it will take some money to protect the timber properly, but I suppose the men who hold that timber will be glad to go down into their pockets and assist the government in carrying out the good work. I do not know what scheme has been formulated, but I believe there is something on the tapis looking towards the proper protection of the timber outside of the twenty mile belt.

Mr. STEWART.—When I undertook this work in reference to the protection of our timber we had the example of the provinces as to the system of fire ranging, but we had to follow it under conditions that were peculiar to the territory. Most of the provinces, especially Ontario and Quebec, have a very large portion of their territory under license, and it was their system to have the lumbermen appoint the rangers and pay one-half of the cost.

In the Dominion territory the greater portion is still unlicensed, and to meet the circumstances we formed the system which I thought was best adapted, and we appointed rangers. The greater part of the territory being unlicensed, the government would of course pay the greater share of the cost of keeping this system going, the idea being that the lumbermen should pay one-half of the cost of guarding their own limits. This system was carried out.

This being for such a wide territory, we had to have some system of control or inspection, or supervision, and as this railway belt in British Columbia is not owned by the railway company but by the Dominion government (having been given to it as the province's contribution for the building of the railway), I thought it was particularly desirable that that portion should be guarded, as it contained a great deal of valuable timber.

The first thing I did was to find an efficient officer to supervise and administer the rangers that were to be put to work there. This district was so far away that it would be a matter of great difficulty to administer it properly from Ottawa. I do not need to say anything more than what has already been said as to the fitness of the man I selected, or whom I recommended as supervisor of that district. I do not think it is necessary for me to tell you that he has proven himself exceedingly efficient in the discharge of his duties in which he has been engaged for the past four years. You have had an idea of the good work he has done from what Mr. Jones told you this morning.

It may seem to you something like a sort of a mutual admiration society to hear us talk of each other in this way, but it certainly has been the greatest pleasure to me to hear the testimony borne by those who have contributed to the cost of this fire-ranging system. It has been a great pleasure to me to hear their approbation of the system, and their appreciation of Mr. Leamy's success in the administration of it.

Just a word with reference to the timber reserves, and to the growing of young timber, especially in the railway belt.

Ever since I started this work I have been endeavouring to set aside forest reserves. Now, the most difficult thing that we have to encounter in this line is to know what we ought to set aside. As Mr. Leamy has pointed out to you, there are certain places in British Columbia which have been burned over, and where, although there is not much merchantable timber, the country is best adapted for the growth of valuable timber, and is covered with a growth of young trees. We intend to set this aside.

There might possibly be a wrong inference drawn from Mr. Jones' remarks. He mentioned the fact that this young timber was mostly jack pine. I think he referred to one district only.

Mr. JONES.—On the Columbia river.

Mr. STEWART.—If you go out farther west you will see that there are some magnificent young forests of fir growing up on the mountain sides.

With regard to the forest reserves, I just want to say this. Within the last two months, before the session was opened at Ottawa, I recommended the passing of a

forest reserve Act, and it was in these terms, that we would have a general Act, which had not existed before (we had the power before to set aside by Order in Council). We wanted something more than that—something more than an Order in Council, because the difficulty with an Order in Council was that influence was brought to bear on the government to have certain areas taken out of the reserve, and it was such an easy matter to pass another Order in Council, whereas an Act of parliament would remove the influence altogether. If it recommended a certain number of those reserves to be set aside, they would be set aside, and there would be no exception to it.

This was one of the suggestions I made to the minister some time ago. After consideration of the whole matter, I was of the opinion that it was better that we should have one general Act of parliament, giving the Governor in Council power to set aside reserves whenever it was considered necessary. I spoke to the minister about it, and he said, 'That does not cover it; the Order in Council can be set aside by another Order in Council.' I said, 'Can't you specify that another Order in Council shall not interfere with this special Act of parliament, so that the Order shall have the same effect as an Act of parliament?' He said that it could be done. We have had the Act prepared, and it is there waiting presentation to the House, and when we get that granted we shall ask the Governor General in Council to set aside those areas, and it will have the effect of an Act of parliament, and will meet the difficulty of having to have a special Act for every reserve that we wish to set aside.

With reference to the province, I have a resolution here that I think will be in order. I think the members from British Columbia will be pleased to have a resolution passed at this meeting, endorsing the resolution passed by the committee some time ago. I do not think that we are going beyond what we should do in passing such a resolution, and I think it will only strengthen the hands of the ministers of the provincial government in carrying out the policy which I know they are anxious to do.

Mr. Green, who is Commissioner of Lands and Works in British Columbia, said last season that he intended to take the matter up this year. I hope it will be done, and that the province will no longer be disgraced by such fearful loss of valuable timber as has taken place within the last few years.

I will put the resolution before the association in the usual way.

Dr. SCHENCK.—Gentlemen, the forestal interests represented by me are not æsthetic in character, nor do they deal with beautiful grounds. It is business forestry in which I am engaged, or forestry from the investor's standpoint, forestry from a commercial standpoint.

It is my opinion that this country requires the preservation of forests on a large scale—not, perhaps, so much the preservation of the forest as the preservation of forestal production. Forestry on a large scale, without doubt, has no birthright in this country, unless it is found to be, or else is made to be, a remunerative investment. Thus it is that I advocate forestry on business lines parallel to those pursued by the agriculturist in the field.

The farmer settling in the prairies finds himself compelled to make a number of investments for the development of his property. These investments consist in the erection of buildings, in the purchase of implements and live stock, in the construction of fences and ditches, roads, and so on. Similarly, the owner of a forest cannot get along without adding to the original timber investment certain other components which tend to bring the entire investment to the highest degree of remunerativeness expressed in the highest possible annual surplus dividend.

In many a case the forest owner is able to pay for these additional investments by reducing the value of the original capital consisting of trees merely.

It would be preposterous to advocate forestry, or the continued use of soil for tree growth, everywhere and under all conditions. Where the trees stand on absolutely agricultural soil there forestry can pursue—if it is a business—the course of forest destruction only, with a view to devoting such absolutely agricultural soil to that production under which it pays best: agriculture.

On the other hand, where the soil is unfit for the plough and unfit for pasture, there the most remunerative industry possible is that of the production of timber.

A legislative body when discussing the advisability of a far-sighted forest policy is of necessity compelled to decide, on the basis of investigation and experiment, what land within the limits of the commonwealth is absolute farm land, and what land is absolute forest land. The policy pursued by the United States has never confronted—perhaps ignored, perhaps avoided—this all important problem. In the eyes of the American, if generalization be permitted, only one legitimate use of the soil is known, and that is agricultural use. To him, forestry is merely a fad.

In your association 'the problem of absolute forest land' has been approached to-day for the first time on this continent. It is difficult, perhaps impossible, to state to-day what land is absolute forest land for all times to come. The conditions which stamp a given acre of land as absolute forest land to-day may be changed by a fluctuating population in days to come, may be altered by increased intensity and by new agricultural methods, may be reversed by the introduction of new crops. In spite of these possibilities, it is necessary that the legislature of a commonwealth delineate *a priori* the conditions which put upon a given quality of soil in a given township the stamp of absolute forest soil.

Future generations may find that the original delineation was wrong; well and good. Future generations may improve upon the present; but do not let us hesitate to do during our day what we consider to be vitally connected with the interests of our commonwealth.

In the United States we meet only too often a mistaken, or a misled benevolence interfering with a far-sighted forest policy. Many a state is desirous, above all, to create 'happy homes for the poor;' to prevent the workman from 'becoming a dependent servant;' to make 'free-holding citizens' out of 'immigrants accustomed to servile dependence.' What is the consequence, only too often, of such benevolence? The very poorest, and hence cheapest land, land forfeited for nonpayment of taxes, land on which the last owner went bankrupt, is thrown open to ignorant immigrants,

MARAINE LAKE, NEAR LAGGAN, ROCKY MOUNTAINS PARK. [32

ignorant of farming conditions prevailing, ignorant of the duties of citizenship, an element eventually unpleased, and, finally, unpleasant because unpleased. Such benevolence does not create happy homes in which the fireside gleams cheerfully; it creates homes in which dissatisfaction and envy are raised to the detriment of the country. Settlement must be properly directed, and must be permitted only on absolutely agricultural land.

As far as Crown lands are concerned, there cannot be any doubt but that all Crown lands having the character of absolute forest land should be reserved from entry. Government ownership of absolute forest land, in its influence on the lumber industry, agriculture, navigation and public health, is vastly superior to private ownership of absolute forest land. Large tracts are required for the successful practice of business forestry on absolute forest land, and such large tracts should always remain under control of the Crown. Far-sighted forestal operations can be expected in the long run only from the long-lived community—not from the private individual.

The provincial legislature can enact, for the benefit of Crown forests, any laws which may safeguard the permanency of forests in the very interest of the commonwealth, a possibility which it is rather difficult for the private individual to secure.

The political platforms of the Canadian parties are unknown to me. It seems to me, however, that every party should be willing to adopt a plank reading: 'All absolute forest land shall be singled out; all absolute forest land belonging to the Crown shall be strictly reserved; farming on absolute forest land shall be discouraged.'

PROFESSOR ROTH.—I am delighted to be with you and thank you for the courtesy extended to me. You will pardon my shortcomings, however, for I came here really to listen and to learn; I came for the inspiration which one gathers from hearing discussions such as we have heard this morning. I am prepared, however, to support in the fullest measure what Dr. Schenck has said about state forestry, or provincial forestry, or Dominion forestry being very much superior to private forestry. I have ventured to express the opinion at a former meeting that that was the experience all the world over—that the commonwealth is the good forestry, and almost the only forestry.

With regard to the selection of what is absolute forest land, I think you will have the difficulties that have been met with everywhere. The farm settler made his mistakes. The people have cleared millions of acres of land which have gradually drifted back into forest land, because they were unfitted for agricultural purposes. This mistake was made in Europe, and was repeated in the New England states. I suppose you are all aware of the fact that in the New England states there are several millions of acres of land which were regarded as agricultural lands forty years ago, and were even cleared and improved, and yet have proven totally unfit for continuous farming, and have reverted to woods or are waste. So that to-day the New England states (small country as it is) have several millions of acres less farming land than they had forty years ago.

In the selection of your forest lands you are liable to make the same mistakes, and on a larger scale, besides provoking, from the first, the opposition of those interested in the development of the particular section.

In the Cascades and other mountains of course the difficulty is less, and the chance of success greater, but in your province or in Ontario the case is anything but simple. On the same forty-acre lot you may find the best of muck soil and the poorest of sand, and in thousands of square miles of land you have good and poor farm land on the same section of land. Your agent will say: 'It is non-agricultural land;' but the settler says: 'But I know better, and I am willing to risk my reputation, my money and my time on making a good farm home.' Who will decide? We in the states have had experience in this direction both as to farm and mineral lands, and our successes have been few, our errors many.

You will probably find ways of solving this problem better than by simple selection. Certain areas might be set aside temporarily until more need for the lands can be shown; you may require payment for the timber; you may defer settlement until the timber has been cut over, and in various ways do away with the arbitrary feature of the simple and costly selection.

Both in this matter of land selection and in the dealing with people living in your reserves a little tact and goodwill is sure to accomplish a good deal. Show those people that their rights are respected, their interests guarded, and at the same time let them understand that the law is supreme, and must be obeyed.

JUDGE WEIR.—Mr. Chairman, will you pardon me if I refer to just one statement that has been made this morning.

Allusion has been made to the magistrates, and to the somewhat curious fact that, notwithstanding statutes fixing the minimum fine and the maximum fine, certain magistrates in British Columbia and in the state of North Carolina have disregarded these provisions of the law, delinquents being frequently discharged, or fined less than the minimum that is fixed by the statute.

I should like to say that I do not think there is the slightest doubt that where the law imposes a minimum fine the magistrate has no right whatever to condemn the accused to a fine less than such minimum, and further, I should be greatly surprised if the laws of every state and province do not as in Quebec provide a certain means of compelling magistrates to impose the penalty which the law requires—by way of *certiorari*, for instance.

If that fact were known, it would, I think, lend strong aid in such cases as Mr. Leamy and Dr. Schenck have referred to, by compelling the magistrate to pronounce a sentence in accordance with the law.

As one gentleman has referred to the pressure that is sometimes brought to bear on members to reverse Orders in Council, perhaps these magistrates are sometimes under similar pressure. But if they were made aware of the fact that the law imposes a minimum and a maximum fine, within which limits only their discretion may move, and outside of which it has no right whatever to go, they could effectively answer requests for leniency by saying, 'Well, the law is so and so, and I have no discretion

but to enforce it. I have no right even to suspend sentence, and no right to impose a fine outside the limits of the statute. My powers are clearly defined there, and I have no option but to follow it.'

What I have said is quite apart from the inadvisability which we must admit of invoking the law unless in flagrant cases, recognizing the superior advantages of educating the population by more pacific methods, to appreciate the incalculable benefits flowing from the careful nurturing of our forests.

Mr. LEAMY.—With reference to the statement made in connection with the magistrates, and the imposition of a much less fine than the law calls for, allow me to tell you this. Another party farther down the river set fire to a clearing and burned his neighbour's fences and barns. The man who suffered made a complaint to the fire ranger, who had the fellow arrested on a charge of destroying the timber on the land. He was brought before the magistrate (the same one, by the way). The neighbour swore that he had offered to compensate him for the damage done to his place, and yet the magistrate did not find that that was sufficient evidence to convict the man.

SECOND SESSION.

The second session was called to order at 2.45 on Friday afternoon, March 10. The president, Mr. Aubrey White, in the chair.

The secretary read a telegram from Mr. J. R. Booth, one of the directors of the association, regretting his inability to attend the meeting, and wishing it every success. A telegram of similar purport was received from Rev. A. E. Burke, vice-president for Prince Edward Island.

The CHAIRMAN.—There are certain recommendations in the report of the board of directors upon which action is advised. It seems to me that the better way to deal with it would be to appoint a committee on resolutions, and send the report to them so that they can frame the resolutions.

I will appoint as members of that committee Messrs. E. Stewart, F. W. Jones, R. H. Campbell, E. G. Joly de Lotbinière, Col. T. G. Loggie, Jas. Leamy, H. M. Price and myself *ex officio*.

The Rev. Dr. Fyles presented the following paper, which was illustrated by numerous charts showing the insects described:—

FOREST INSECTS.

REV. THOMAS W. FYLES, D.C.L., F.L.S.

Forty years ago I had the pleasure—never to be forgotten—of a tramp in a remaining portion of the primeval hardwood forest of the eastern townships. It was on the Coffin estate, in the township of Ely, and near the small settlement of Bosco-

bel. I can recall in a measure the feelings that I then experienced. On every side, as far as the eye could penetrate, arose the tall, straight, symmetrical shafts of trees. Far overhead were the intermingled branches and the dense canopy of foliage, through which no glimpse of the blue sky was obtainable. All below was in a strange half gloom; and there was unbroken silence. Whatever there was of bird or insect life was on the brighter side of the leafy covering above.

Another thing that was remarkable in this forest was the entire absence of undergrowth. One could walk without hindrance in any direction. It was the sort of forest that Fennimore Cooper and Dr. Bird delighted to portray; and I remember feeling that, however unpleasant it might be, the appearance of an Indian in his war-paint would not be out of keeping with the scene.

I was at that time in charge of a new mission, in what was called—and very appropriately called, in those days—Brome Woods; and there I built a church and a parsonage, and bought a lot of land. I resided there for eight years, entering into the every-day life of the people, and so, serving an apprenticeship to wood-craft: and there I gained much of what I know concerning forest insects and their habits.

Pardon me if I dwell for a moment upon the time, the place and its inhabitants. The seeming digression from my subject will help us to understand the conditions under which valuable stretches of standing timber may be placed in danger, and forest insects multiplied to a mischievous extent; and I trust that the retrospect will not be without its lessons for the present.

The settlement on which I lived lay at the head of a beautiful valley in the heart of the Brome and Farnham mountains. A stream ran through the middle of it, large enough to run a small mill, in which was a pair of stones for grinding Indian corn, and an old-fashioned up-and-down saw, which, when in operation, reminded one of Tennyson's

> ——————'dry
> High-elbowed grigs that leap in summer grass'—

the grasshoppers and crickets which see-saw their spiny shanks against their hard wing-covers, and so produce the stridulations that enliven the autumn evenings.

After running for several miles the stream fell into a beautiful little lake at the end of the valley.

The first settler in the district, Mr. John Shufelt, was still living on an adjoining lot to mine. The people generally were an exceedingly kind-hearted people, honest, industrious and hospitable; but oh, they were sadly lacking in economy in their dealings with the forest.

Excuses can be made for them; they formed a community living to themselves; they were seven miles from the nearest railway station, which was on the Col. Foster road to Waterloo. Except their own requirements there was no demand for forest products—with the one exception of hemlock bark; and that sold for two dollars per cord only. It was bought for the small tanneries in places round.

On my land and extending beyond it was a stretch of first growth maples. How barbarously the trees had been used. A former proprietor in his sugaring operations had tapped them with an axe, cutting sloping gashes six or nine inches long.

The trees were left in a state to invite the attacks of borers. They abounded with horntails and beetles—they were doomed, and only fit for firewood.

The settlers had beaten back the forest here and there, till they came to the black timber on the slopes of the mountains; and on the borders of this, giant hemlocks were left exposed to the winds that sometimes rushed up the valleys and mountain defiles with great fury. Again and again I saw tree after tree tumbled over by the wind. I paced one of these fallen veterans, and found that it measured ninety feet from the roots to the first branch. Generally speaking, the trees were left where they fell; and, as nature abhors waste, they were soon attacked by beetles and Siricidæ, which multiplied in them exceedingly.

The woods were full of brush and tops of trees, where men had cut their winter's fuel. Brush fences, for keeping in the cattle, ran in different directions. Such a

fence was a regular *abattis*. Trees in a line were felled one upon another, and the interstices filled in with smaller trees. It can readily be believed that under such conditions forest fires were not infrequent. A fire of this kind on one occasion gave me a fright. I was driving home at night when I saw a great glow of fire in the direction of the church. I whipped up my horse and reached the top of a commanding hill. Yes, I said, it is the church; the fire is mounting the rafters and the steeple. But, on coming yet nearer, I perceived the dark outline of the building against the glow, which was that of a forest fire climbing the mountain beyond.

At the present day the pulp manufacturer is undoubtedly a great boon to the small farmers. We see piles of prepared logs at nearly every country station along our railways. I have often wondered whether the bark from these, and the brush and tree-tops, are left scattered through the woods, to take fire some day, and spread devastation over the land.

But I must without further preface come to the consideration of my subject.

Insects fall naturally under two heads: biting insects, *Mandibulata*, and sucking insects, *Haustellata*. To the former belong the borers in the tree-trunks, the twig-girdlers, and the leaf-devourers; to the latter, the cicadas, the scale-insects and the plant lice. It is difficult to tell which of the two orders is the more hurtful to vegetation. In 'God's great army' the most insignificant corps becomes occasionally, by force of numbers, a formidable array.

In the summer of 1881 the maples presented a strange appearance. Their foliage became brown and withered, as if autumn had come before its time. On examination it was found that countless multitudes of the larvæ of a minute species of moth, *Depressaria acerifoliella*, Haworth, had assailed the foliage. The lava of this species bites disks from the leaves and binds them together with a silken filament, so constructing a case for itself. It protrudes its head and forelegs from its case, and moves about the leaf eating away the parenchyma.

In 1893 another remarkable insect attack upon the maples was witnessed: nearly every leaf of the trees was drawn out of shape—its edges being fastened together with a fine web. Within the tent thus formed was a curious brown case, somewhat in the form of cornucopia; and snugly ensconced within the case was a green larva with an amber-coloured head. This truly was one of the most economical of insects!

Longfellow has said:—

'O thou sculptor, painter, poet!
Take this lesson to thy heart:
That is best which lieth nearest,
Shape from it thy work of art.'

And this larva had used up its *exuviæ* and *excrementa* in forming a case for itself—an inner retreat. The leaf was its shelter and store of food; for it fed upon the parenchyma, and left only the veins and skin. The case was its stronghold. The name of the insect is *Semasia signatana*, Clemens.

Our native insect pests are bad enough, but the insect foes that we most dread are the foreigners—the immigrants, for the reason that, '*It is better to have to contend with the devil you know than with the devil you don't know.*'

The advent of *Nematus Erichsonii* is an old story now. This pest destroyed our tamaracks in the eighties, and it—

——'still goes marching on.'

Mr. A. H. D. Ross in his excellent article on 'The Forest Resources of Labrador Peninsula,' tells us that, 'Of late years the European larch saw-fly has destroyed most of the larch between Lake St. John and Lake Mistassini, and the pest is spreading northward.'—Can. For. Journ. V. I, No. 1, page 32.)

The Gipsy moth, the Brown-tail moth, and the Leopard moth are new importations to the country south of us.

So great a plague has the Gipsy moth been in Massachusetts that the legislature in four years (1890-94) expended $275,000 in the effort to exterminate it, and had not succeeded; and further appropriations were required.

The larvæ of the Brown-tail moth are also injurious in Massachusetts; and as their fine barbed hairs are easily detached, and carried in the air, they often settle upon the passers-by, work their way into the pores of the skin, and cause much suffering. They are greatly to be dreaded. A lady wrote concerning them: 'We first noticed the caterpillars in 1897, and we could do nothing with them. We had to take brooms and sweep them away from the doors. They ate the leaves off the trees, so that we did not get any fruit that year, or in 1898. The caterpillars seemed to come all at once. We were all poisoned with them. The houses were full of them. They were a sight. They were on everything,—fences, shrubbery and flower bushes. The place was fairly alive with them. They were even in the bed rooms.' (Mrs. Peter Mooley, in Fernald and Kirkland's Report on the Brown-tail Moth, 1903, page 19.)

Fancy the good lady with her broom, like Mrs. Partington, sweeping back the sea.

The larvæ of the Leopard moth are *borers*. The species has in some way been carried from Europe to New York.

In Canada a very common and mischievous pest is the Forest-tree Tent Caterpillar, *Clisiocampa disstria,* Hubner. This also flourishes more abundantly some years than others. In 1899, it and its congener, *Clisiocampa Americana,* Fabricus, were so abundant in the counties of Drummond and Shefford, that they stripped the second growth trees bare. Hordes of them crossing the railway, brought the train to a standstill—the rails having become slippery with crushed larvæ.

The larva of *C. disstria* can readily be distinguished from that of *C. Americana* (the Orchard Tent-Caterpillar.) It has a *blue* head, and a row of silvery spots down the back; while the other has a *black* head, and a continuous white dorsal line.

I consider *C. disstria* the worst of the leaf-eating foes of our hard-wood trees.

The larvæ of the Tussock Moths, *Notolophus antiqua,* Linneus, and *Notolophus leucostigma,* Smith and Abbot, are handsome but mischievous. They are tufted along the back, as the generic name indicates. Those of the latter species may be known by their red heads. Both kinds feed upon a variety of trees. Dr. Felt says of Leucostigma: 'This species feeds readily on elm and maple leaves, displaying a special preference for horse-chestnut and linden, and frequently does considerable damage.' (Bulletin, No. 27, N. Y. St. Mus. p. 41.)

With us at Quebec both kinds particularly affect the white willow. In 1897, which was a great insect year all over the country, the white patches of the eggs of *N. leucostigma* could be seen, in great numbers, on the trunks of the willows on Mountain Hill.

The males of these Tussock Moths are called "Vaporers" because of their jaunty flight. They skip hither and thither, as Wood says—'Like Cœlebs in search of a wife.' The females, on the other hand are most exemplary in their behaviour. St. Paul, if he had been an entomologist, would have admired them greatly—they 'go not from house to house.' They remain upon the cocoons from which they crept. There they await their mates; there they lay their eggs; and there they die.

We must not give them too much credit for their domestic virtues. They are aided by the force of circumstances in conducting themselves well—they have only rudimentary wings.

There are a number of large moths, the larvæ of which, under peculiar circumstances, might become injurious to forest-trees. Their very size makes them formidable. The larvæ of the Hawk-moths, *Sphinx chersis,* Hubner, and *Sphinx Kalmiæ,* S & A., feed upon the ash, though I frequently find them on the lilac. This is not surprising, for both the lilac and the ash belong to the same family of plants, the *Oleaceæ,* of which the olive-tree is the type.

The larva of *Ellema coniferarum,* S. & A., feeds upon the pine. I wish the species were a little more common, for in all these years, I have obtained only one specimen of the moth for my collection.

The larvæ of *Ceratomia Amyntor,* Hubner, feed upon the elm. They have four prominent horns upon their shoulders; and Harris on this account gave them the

name of *Quadricornis*. There are peculiarities in the form and habits of the larvæ of this species that are well worth notice.

You will remember that the leaves of the elm on the underside are strongly and regularly ribbed; and that they are often curled over on one side in a roll. The Amyntor caterpillars are of the same colour as the leaf; and, along the sides they have seven oblique, raised, rough lines. They lie extended along the edge of the leaf, and in that position very closely resemble the roll of the leaves near them. Nor is this all: in the autumn the leaves of the elm become rusty-brown in colour; and, that the resemblance to the leaves may be maintained, the caterpillars become of the same hue. They afford in this a remarkable instance of what is called Mimetic Analogy.

The larva of that stately moth, *Triptogon modesta*, Harris, feeds upon the poplar; and that of *Cressonia juglandis*, S. & A., upon the black walnut, the butternut and the hickory.

Upon a variety of forest trees, the larvæ of those magnificent Saturnians,—*Attacus Cecropia*, Linneus (the largest of our moths), and *Telea Polyphemus*, Cramer, are to be found; whilst those of *Actias Luna*, Linneus, (the most beautiful of all our moths) feed upon the butternut; and those of *Hyperchirea Io*, Fabricius, upon the elm, the bass-wood, and the balsam-poplar. The last named larvæ are set with stinging spines.

In the west the larva of that splendid moth *Eacles imperialis*, Drury, feeds upon the white pine; and the larva of *Citheronia regalis*, Fabricius—which has as many horns as the Beast in the Apocalypse, and is locally known as the 'Hickory Horned Devil'—feeds upon the black walnut, butternut and hickory.

I have never heard, however, that the caterpillars of these very large insects have done very much damage.

Of insects that injure the roots of the trees, these call for our attention:—

The White Grub, which is the larva of the May Beetle, *Lachnosterna fusca*, Fröhling. The grubs of this species are very general feeders upon the roots of plants. They have been found exceedingly injurious to young pines and tamaracks.

A formidable foe to the poplar, basswood and oak is *Prionus laticollis*, Drury, the Broadnecked Sawyer, which bores into the roots of the trees. I have not found it at Quebec; but I have seen a specimen that was taken at Sherbrooke. As it works under ground, its ravages are not easily detected.

But of the underground insect foes of the forest trees, the Cicadas are, I think, the worst. Happily this part of Canada is out of the range of *Tibicen septendecim*, Linneus, which spends seventeen years at the roots of trees, imbibing at the very founts of vegetable life. But *Cicada canicularis*, Harris, is very abundant in these parts . If you go into the woods in autumn you will hear the shrill sound produced by their little tambours or side drums whch vibrate, as the boys say, 'for all they are worth.'

We have another species of Cicada, *Tibicen rimosa*, Say, but it is not common with us.

The habits of the Cicadas are interesting. The females cut grooves in the twigs of their favourite trees; and in each groove lay a row of eggs. The eggs seem to be nourished by the sap in the twigs, for they become enlarged. The newly hatched larvæ drop to the ground, and burrow till they reach the roots of the trees. Into these they drive their beaks, and then, for three years, live, by suction, upon the sap. At the end of that time they work their way out of the earth, climb for a short distance up the trees, and then writhe and twist, till their skins burst down the back. Out of the rent, in every case, creeps a perfect insect, drawing its legs out of their former enclosures, as out of boots. In about ten minutes (I have watched the process), the air has penetrated to every part of the insect's body; its wings have been shaken out of plait, into their full dimensions; and the creature is ready for flight.

If you ask me, what should be done to check the cicadas? Well, I know what I should do as regards the orchards, the sugar-bush, and the inclosed woods. I should,

in the autumn, turn a sounder of swine into them. The animals would not only eat the wind-fall apples, the acorns and beech-mast and fungi, they would grub about the roots of the trees and devour the immature kinds of flies, beetles and moths. I have seen the experiment tried; and the pigs throve.

But a part of my subject of more interest to lumbermen is that relating to the Borers—and truly their name is *legion*.

A number of beetles belonging to the family Buprestidæ bore in the pine. Two splendid beetles of this family are *Chalcophora Virginiensis*, Drury, and *Chalcophora fortis*, Le Conte.

C. fortis is the largest and handsomest of our Buprestidæ—and perhaps, as regards our collections, the *rarest*. Mr. Hague Harrington speaks of it as rare at Ottawa; and I never met with it at Montreal, nor in the eastern townships; but one day I was walking under the cliff, at Hadlow, on the south side of the river, when I found specimens of both *C. Virginiensis* and *C. fortis*. There were no trees near in which they could have bred, and the insects were fresh and perfect. The discovery was a marvel to me till, on looking to the river side, I saw, stranded, a crib of pine timber; and then the mystery was solved. This incident shows how easily insects may be spread over the country.

There is a bettle called the Titillator, *Monohammus titillator*, Harris, which somewhat resembles, both in appearance and habits, the beetle called in Scotland the 'Timberman.' The Titillator, and its congener, *Monohammus marmoratus*, Randall, make damaging tunnels in the trunks of the pine, and they sometimes turn up unexpectedly in places far from their native forest.

One afternoon I was sitting in my study in the rectory at Cowansville, which was then a new building. Suddenly a strange object came down with a clatter upon the book I was reading. It was *M. titillator*. Where did you come from? I said. I looked around and soon discovered a hole it had made in the casing of the door. What an experience that insect had gone through. It had sprung from an egg laid in a crevice of a standing pine. The tree into which it had eaten its way had been cut down, hauled through the woods, soaked in the mill-pond and cut up by the circular saw. The boards had been banged about in the piling, had been kiln dried, and then passed through the planing machine. That particular board in which was the habitation of the beetle had been worked by hand in the sash and door factory, planed, and fitted, and hammered, and painted, and varnished, and, surviving all the rough usage, and escaping all the deadly weapons, there lay *Monohammus titillator* snugly ensconsed in his square inch of the wood, reserving himself till he could present himself as a gentleman.

The larvæ of a number of these longicorn beetles are borers in various forest trees. Those of *Monohammus scutellatus*, Say, play sad work with the spruce. A fine spruce, growing in the premises I rented some years ago, broke off near the ground. I found that, for about three feet upward, the trunk had been bored through and through in every direction by the larvæ of this beetle.

The larva of *Plagionotus speciosus*, Say, is a borer in the maple. That of the fine beetle *Saperda calcarata*, Say, bores in the poplar. The apple tree borer, *Saperda candida*, Fabr., works also in the American mountain ash and the thorn. The larvæ of *Saperda vestita*, Say, *Saperda tridentata*, Olivier, and *Cyllene pictus*, Drury, bore respectively in the bass-wood, the elm and the cedar (*Thuya occidentalis*, Linneus).

Time would fail me to enumerate the small beetles which mine between the bark and the white wood, and which at times do great harm—volumes might be written upon them.

But I must not pass over the most important of the *Lepidopterous* and *Hymenopterous* borers. Of the former we have remarkable instances in *Cossus centerensis*, Lintner, which bores in the balsam poplar; in *Prionoxystus robiniæ*, Peck, which, as its name implies, bores in the locust or false acacia, and in *Prionoxystus Macmurtiei*, Guerin-Meneville, which Mr. A. F. Winn has found upon oaks on Mount Royal.

Some thirty years ago I discovered *Cossus centerensis* at Cowansville, Que. At that time the insect was unnamed and undescribed, but I was not then sufficiently ac-

No. 4.— By preventing evaporation from the surface of the snow in winter and by preventing the rapid melting of the snow in spring, the forest adds very greatly to the volume and regularity of the stream flow.

quainted with the Cossidæ to know this. It remained for that able entomologist and excellent man, now gone to his rest, Dr. J. A. Lintner, State Entomologist of New York, to name and describe this fine insect.

The moth lays its eggs in crevices of the bark of the poplar. The young larvæ eat into the tree, and as they grow enlarge their tunnels. When they approach the end of their larval career they bite their way to the surface, leaving only a thin flim of bark between them and the outer air. They then retire into their tunnels, beyond the reach of the woodpeckers, to undergo their pupal change. But when the time arrives how can the footless chrysalis reascend the tunnel that the moth may escape? Nature has provided for this. Around each of the abdominal segments of the chrysalis is a row of serratures or teeth which give it a hold upon the sides of its tunnel and enable it to work its way to the outlet. It then thrusts itself about half an inch through the opening. Its case bursts open, and the perfect insect escapes.

The horn-tail, *Tremex columba*, Linneus, is a creature of formidable appearance. It has a stout acuform, but *hollow* ovipositor, which extends in its sheath from the middle of the underside of the abdomen to a length of half an inch beyond its extremity. The Tremex drives this instrument through the bark and into the soft wood of the tree (which is usually a maple or a beech), and then by muscular action it passes its eggs through the ovipositor to the end of the wound it has made. The Tremex is, in many instances, so exhausted in the process that it has not strength to withdraw its ovipositor and perishes at its post.

As soon as the young larvæ are hatched they begin to tunnel in different directions, enlarging their passages as they grow.

Other horn-tails of like habits to the Tremex are *Sirex albicornis*, Fabricius, *Sirex flavicornis*, Fabr., and *Paururus cyaneus*, Fabr., and these assail the pine.

It must not be supposed that nature has left these borers to multiply and work their will without a check. If she had, the forests would long ago have disappeared. No, a number of formidable ichneumon flies, with yet longer ovipositors, are engaged in reducing their hosts.

Indeed every kind of destructive insect has its foes. Insectivorous birds and predaceous insects under ordinary circumstances keep the spoilers within bounds. And man may give his assistance to nature for the same end. For instance, he can preserve the woodpeckers and soft-billed birds. The man who would shoot a woodpecker deserves to be ostracized. I wish I could hear more frequently the boisterous laughing call of that noble bird, the Bonnetted Woodpecker, *Picus pileus*. Alas, its beauty has been to it 'a fatal gift.' It has drawn the attention of the fowler.

When a tree is found with horn-tails affixed in the position I have mentioned, it may be known that that tree is a hopeless case. It should be felled, and split for stove wood, and then certainly one colony of borers would be destroyed.

The proper and timely burning of bush-piles will do much to lessen the numbers of insects. Brush should be burned, not when the ground is covered with dry herbage and dead leaves, but *when vegetation is lush and green;* and this is the time when insects abound, and when fire and smoke would work havoc amongst them.

It would be, I think, for the public good if our government would appoint, in every county in which lumbering operations are being carried on, and new settlements formed, *Government Foresters*, intelligent men of high character. Their duties should be to preserve the game, destroy the wolves, regulate the burning of the *debris* of the lumber camps and clearings, see to the due observance of forest-laws, and generally to conserve woodland interests. They should wear a uniform that their office might be known. I think that such government *employés* would have important duties to perform, and that their life would be an interesting and attractive one. I can fancy them taking up Amien's song and saying:—

"Under the greenwood tree,
Who loves to *roam* with me,
And tune his merry note

Unto the sweet bird's throat,
Come hither, come hither, come hither;
Here shall he see
No enemy,
But winter and rough weather."
and—*mosquitos !*

PROFESSOR ROTH.—I have been most delighted with this excellent resumé of the subject, and wish to say that it is perhaps the best I have ever had the pleasure of listening to. It has brought before us something which very few appreciate to its full extent.

I have enjoyed listening to the paper doubly, because of its beautiful and complete presentation and because it brings before us a subject which we are apt to shove aside as unimportant.

The average timberman in the United States, and I suppose the same may be said of his Canadian brother, is one who thinks of the man who talks of insects as one of those enthusiasts—a 'bug hunter.'

The CHAIRMAN.—A 'bug sharp.'

Professor ROTH.—Yes, 'bug sharp.' The average timberman looks upon him as simply one of those persons who chase bugs just for the pleasure of making a collection of them, and to talk about them. Very often he fails to see that the 'bug hunter' as he calls him, is the man to discover and to teach us to fight the greatest enemy of the forest.

We are apt to think of the forest fire as the greatest enemy of the forest, and we are always talking of means of overcoming it, and in the heat of the discussion we are apt to forget sometimes that we have another foe and that long after the fire we still have to deal with these 'little people.'

These 'little people' are with us, and have always been with us, and they seem to be with us whether we take care of the forest or not.

If you take the trouble to run over the little calendar which the forester in Germany carries in his pocket to make notes of things, you will find there recorded what he shall do from month to month, and you will invariably find one of the longest paragraphs devoted to the insects that he shall look after.

We have never fully learned the damage we have suffered. As an instance, permit me to call your attention to the case of the Black Hills.

People chopped down timber summer and winter. Some one suggested that it might be better to do the chopping in the winter only, but they kept on chopping, and the first thing they knew they had a pest of the little brown bark beetle, an insect so small that most people would hardly notice it. And what was the result? In 1902, one could stand on an eminence near Spearfish creek and see at one glance at least four townships of timber practically destroyed by this minute beetle, and most people knew nothing of what the real trouble was, and still less about what could be done for it.

Dr. Hopkins, of the Department of Agriculture, studied the beetle; he recommended the restriction of the cut to the infested timber, and recommended it removed as quickly as it became infested. As soon as the timber becomes infested it begins to change colour, so that this method is perfectly feasible. The result has been very beneficial. The pest is not one of these mysterious things that cannot be fought. If people of the Black Hills had restricted the cut of the timber to proper seasons or had cut all the infested timber by restricting the cut of the timber to proper seasons or could have fought the beetle back to certain lines, where the birds and the other natural enemies (of which we have heard in the Rev. Mr. Fyles' paper) would have easily taken care of it and brought back the equilibrium.

But people did not do that. They did not know what to do until Dr. Hopkins told them what they were really suffering from.

In the country we suffered losses from insects to the extent of millions of dollars every year. Most of the time the insect pest affects people in such a way that they make no complaint. So far they have endured it just the same as drought, or frost, nothing is said about it, and very little inquiry is made as to possible remedies.

I believe that papers of the kind just read by the Rev. Mr. Fyles, and instructions given along the same lines will bring home to the people who are interested in the forest the possibilities of the insect enemies, and will get the people interested, not for any sentimental reasons, but because they want to be rid of a costly and dangerous enemy or at least want to know how to fight them and thus restrict the possible losses.

COLONEL LOGGIE.—Before beginning my paper I would like to tell you this. In the first place, I wish to thank the association for giving me an opportunity of reading a paper at its annual meeting, and in the second place I would like to explain that I am not an expert in forestry. My duties do not lead me into the forest. I am simply what you might call an 'inside man,' and have never had as much opportunity to study the forest as I would like.

Perhaps I might also tell you how I came to be here and to read a paper before you. Your good secretary was roaming around Nova Scotia and New Brunswick looking for somebody to read a paper. I don't know if he found anybody in Nova Scotia, but he came to me looking pretty careworn and said: 'I wish you would prepare a paper.' Well, I kind of took pity on him and said that I would do my best.

Now, you all know that an 'inside man' has very little opportunity to study the forest as it really is. He has to keep his nose to the draughting table, or some other table, and the only chance he has of seeing the forest is when he takes his holidays.

I am very sorry that the premier of our province, Hon. Mr. Tweedie, has not found it possible to be present. He is a gentleman who takes a great deal of interest in forestry and all that is connected with it.

In New Brunswick the forest expert is hard to find. We have a great many people who take an interest in forestry and who are lovers of the forest, but I venture to say that we have no really prominent expert in forestry. The late Edward Jack was probably the only man, of late years, who could be called an expert in the matter. He was

sent by the government to the Forest Exhibition in 1884 in Edinburgh, but I do not think it was followed by anything special.

I was speaking to the lieutenant-governor of the province the day before yesterday, and he was very sorry he could not attend. Our legislature opens to-day, and you can easily see that it would be very difficult for those gentlemen who are connected with it to be here.

NEW BRUNSWICK'S FORESTS.

BY COL. T. G. LOGGIE, CROWN LANDS DEPARTMENT, FREDERICTON, N.B.

From its earliest history, the products of the forests of New Brunswick have held a first place in its trade exports. Although a large section of the province is admirably suited for agriculture, particularly the magnificent intervales of the River St. John, stretching almost from its mouth upwards to the limits of the province, a distance of 300 miles; of the Miramichi, Kennebecasis and other valleys; the broad salt marshes of the upper Bay of Fundy; still lumber has remained King.

New Brunswick contains an area of 17¾ millions of acres, of this acreage 10½ millions are granted lands and 7¼ Crown Lands, and the province is everywhere drained by large rivers, with innumerable branches, almost locking each other at their source.

It will thus be seen that lumbering can be carried on advantageously, as one has yet to find a section of the province, where logs cannot be cut and driven down these waterways to market. Of these rivers, the St. John is the largest, and drains nearly one half of the province. Next in importance is the Miramichi, its watershed embracing about 5,000 square miles.

The settled portions of the province are principally along the river valleys and coast line; the interior forming one vast timber preserve and embracing a territory 80 miles wide and 100 miles long, without a habitation of any kind, save the lumberman's and trapper's shanty and no sound, except the ring of the woodman's axe or the call of the hunter. Here is a domain fairly free from the ravages of fire, and timbered with all kinds of valuable lumber. The greater part of this territory is unfit for cultivation, lying on the granite and boulder formation, although the northern sections, in its approach to the Restigouche river runs into the Upper Silurian belt, and consequently has good deep soils. Everywhere over the belt both black and white spruce abounds, some pine and vast quantities of the hardwoods that have scarcely been touched, also large quantities of the finest and largest cedar in eastern Canada.

Leaving this section of the province, and turning our attention to the country lying southerly and south-westerly of the south-west Miramichi, and extending to the Bay of Fundy, we find a territory heavily cut and in places badly burned. The Nashwaak river is an exception, where Alexander Gibson, our lumber king, still reigns supreme.

FOREST FIRES.

In reading reports from time to time, of the timber domain of Canada, as well as of the United States the same story is read and re-read of devastation by forest fires. New Brunswick has not escaped. The great Miramichi fire, that swept through this province in the year 1825 is a matter of history. Scarcely a year elapses, without more or less fires, although of late we have suffered less perhaps, than our neighbours.

Our legislature and lumbermen have grappled for years with this great question, and the government has still under consideration more effectual methods for check-

ing the ravages of forest fires. In the year 1885 the legislature passed the Act now in force. It contains provisions prohibiting fires from being set between the first day of May, and 1st December, except in clearing land, obtaining warmth or necessary industrial purposes, and then precautionary measures to be taken. It is the opinion of many that no fires should be set at all, except under a written permit from the fire warden of the district. No fire to be set in the forest without first clearing away a spot five feet from where the fire is to be set. The Act provides that lumbermen shall call their crews together, read the Act and warn them as to setting of fires.

The railway companies are required to provide their smoke-stacks with a bonnet, or screen, interwoven at the draught with three wires (three times as many wires for wood as for coal) and sectionmen to pass over their sections once a day. The right of way to be cleared of all combustible material. A further Act provides that $2,000 can be expended in any one year, in carrying out the provisions as enacted. It is the opinion of many that while the provisions are to a large extent admirable, this Act can only be carried out by a well selected corps of foresters and fire wardens, permanently employed by the province, and along the same lines as the regulations of the province of Ontario. These wardens could act as scalers of lumber, fishery and game wardens, Labour Act commissioners and in other capacities of a public nature. The outlay for such a service would be large, but the results would be far-reaching and in the best interests of the province. There is no question in New Brunswick to-day of more importance than the preservation of the forests.

The total area remaining in the possession of the Crown, as stated at the outset, is in the vicinity of 7¼ millions of acres, of which quantity, 6¼ millions are under timber license, the remaining one million acres, being to a large extent, burnt and barren lands. Licenses from the Crown are issued annually, but there is an understanding they will run to August 1, 1918. The stumpage on spruce, pine, fir and cedar is $1.25 per M. sup. ft., and the yearly rental is $8 per sq. mile.

The average annual cut for the last five years has been 120 millions of sup. feet, classified as follows:—

Spruce and pine	95	millions sup. feet
Cedar	15	"
Hardwood	4	"
Hemlock	3	"
Fir	3	"
Total	120	"

Twenty-six scalers are employed to survey this lumber. There is a chief scaler in addition, whose duty it is to oversee the scalers under him and report to the department the various operations being carried on and the probable cut of each operator.

There are restrictions in the licenses, as to the cutting of undersized lumber, and no tree is allowed to be cut down that will not make a log 18 feet long and 10 inches at the small end. The government have, at various times been strongly pressed to allow undersized logs to be cut for pulpwood, but so far these requests have been met with refusal. In some sections where spruce has been found to be of a stunted or slender growth and would never mature to sawlogs, the government have allowed the lumber to be removed, but the quantity so cut has been very small indeed.

In administering the forests of the Crown, one of the greatest difficulties met with is to guard the department against fraudulent applications for land, under the guise of settlement.

The tendency in applying for settling lands, is to secure a lot sufficiently timbered so as to allow the settler something at the start he can turn into money, either by cutting the logs himself or selling his chance to some one else, which is directly contrary to the provisions of the Labour or Settlement Act. The greater number of those applying have no other motive than to cut off the lumber, and then allow their applications to lapse.

The department is continually holding up applications, where reports have shown the lands are unfit for settlement. The licensees naturally protest against any such incursion into their limits, and the department is left to adjudicate the matter, often to the displeasure of the settler or the licensee.

A common practice is to squat upon Crown lands, without application, clear a small portion and erect a hut. In time, the department is forced, by some settling conditions, to approve his application, although in many cases the location is made among good timber. One can easily see the result. The cleared portion must be burned and the surrounding forest is at once placed in jeopardy.

The separation of purely agricultural lands from the lands only fit for timber growth is to my mind, one of the greatest needs in our forests to-day. I have reference to lands at present only in the vicinity of settlement. Such an undertaking would, no doubt, involve a large expense. Only persons should be employed for this work whose judgment could be relied upon as thoroughly competent in judging the soils. Following this up with a corps of competent foresters for keeping down fires and supervising the cutting is the first essential to the preservation of our forests.

PRIVATE OWNERSHIP OF LANDS.

Of the lands that have passed from the Crown, I will only deal with three of the largest tracts. The grant to the New Brunswick Railway, for building a narrow gauge railway from Fredericton to Edmunston, a distance of 167 miles, was 1,647,772 acres, and embraces lands principally on waters tributary to the River St. John and including parts of the counties of York, Carleton, Victoria and Madawaska.

Mr. W. T. Whitehead, the company's agent, has this year, given me the following estimate of the quantity of lumber on these lands:—

Spruce	3,014	million sup. feet.
Fir	3,014	"
Hardwood	4,743	"
Cedar	406	"
Total	11,177	"

Of this large tract the company has sold only 600 acres. Fully one-third is situate on the upper Silurian formation, representing some of the best settling lands in the province, but the policy of the company is not to sell any for farming purposes, and the progress of that section of the province is consequently retarded.

It has been proposed that the government should buy back the settling portion of these lands, which if accomplished at a reasonable price, would, in the opinion of those who have studied the question, be productive of great results.

The next largest ownership is that of the Alexander Gibson Company, who hold the fee simple on upwards of 225,000 acres located principally on the Nashwaak river, and absolutely controlling the lumber lands on that river. Mr. Gibson purchased the greater part of these lands in the early sixties and has been cutting them ever since, without a break. The growth is principally black spruce, which replenishes itself about every ten years, in cutting down to merchantable logs.

In a conversation I had with Mr. Gibson, some ten years ago, he estimated these lands as worth to him twenty dollars per acre. It must be understood, however, that any such high valuation can only be explained by the peculiar advantages possessed by the owner. Over 1,000 millions of spruce have been cut on this property since Mr. Gibson's purchase, and judging from reports, the lands to-day are fairly abundant in timber.

It may be mentioned here, that as much as 20,000 sup. ft. per acre of spruce has been cut on choice bits of this property. In this connection, I may mention the cut on a block of 3,000 acres I purchased on the Keswick river, in the year 1887, a tract not particularly well timbered at the time, but fast growing black spruce. In that

year, I let the stumpage on one million feet. Again in 1892 it produced two million feet and again in 1900 the operator paid me stumpage on two million more. In 1897 I am looking for a further crop of two millions. So much for the old Scotch proverb:—

'Be aye stickin' i na tree; it'll be growin' when ye're sleepin'.'

The lands of Mr. Gibson have not been subject to much forest fire, partially owing to the distance from railway lines, but more particularly to the vigilance which the owner displays in dry times.

Another large tract is that located on the upper waters of the south-west Miramichi, embracing an area of 160,000 acres, which, I understand, has lately passed into the hands of an American syndicate at a price of upwards of $600,000. The timber growth is much the same as on Mr. Gibson's property.

SURVEYS OF TIMBER LINES.

No timber lands can be properly managed without a system of carefully prepared surveys and block timber lines, as well as accurate maps. Generally speaking the Crown Lands are blocked off in areas of six square miles, the lines running astronomically north and south and east and west, 2½ miles each way. On some rivers blocks are laid off 5 miles each way, and in the Restigouche country the blocks are as small as 1,000 acres. The practice is to run the base lines 5 miles apart and large expenditures have in this way been made by the government. The sub-divisions of the licenses are surveyed after first getting an order from the Crown Land office, accompanied by a plan, showing in detail previous lines run, while the order contains a description of the lines to be surveyed. All these surveys have been made by blazing lines through the forests with the ordinary compass. The system is open to considerable objection, but it is found practically to satisfy those whose interests are involved.

A recommendation has been made to erect iron monuments at the corners of blocks, it being found that corner posts soon decay or are swept away by forest fires.

VALUES OF TIMBER LANDS.

My experience would warrant the statement that timber lands have doubled in value within the last ten years.

For the right to cut on Crown Lands, not including stumpage, fairly good timber lands would be worth $200 per square mile and first-class lands $500 and over a square mile, according to location. The price of soil right lands has probably increased in the same proportion, prices ranging from two to five dollars per acre, although some properties have lately been sold much above these figures and running as high as ten dollars per acre for prime black spruce lands, easy of access and comparatively free from fire danger.

In summing up this paper, which has already grown to too great a length, I would recommend:

1st. More effectual means for the protection from fires.

2nd. The separation of the timber lands from agricultural lands.

3rd. A carefully selected corps of permanently employed foresters.

4th. Restrictions as to the cutting of undersized timber.

Perhaps I may be expected to add reforestation, and while much can be said about tree planting, I am of the opinion our efforts at present will be better met by a more efficient preservation of our forests and more careful cutting of the standing timber. New Brunswick has yet a noble heritage in her forests. Let us then work together to preserve this heritage so that we ourselves and future generations may reap the benefits which nature has so lavishly bestowed.

In conclusion, again, let us not forget the old Scotch saying:

'Be aye stickin' in a tree; it'll be growin' when y're sleepin'.

Mr. STEWART.—Mr. Chairman, I would like to ask a question. I understood Col. Loggie to state that the limits had been gone over every ten years. I would like to have that point made clear. What size do they cut in order to go over it again in ten years and get another cut profitably? I may say that I understood the same thing from Senator Snowball some time ago. He gave me to understand that he cut his limits every ten years. What I would like to know is do you get the same quantity each cut, of course omitting the virgin cut. Subsequent to the virgin cut what quantity do they get, and is it the rule to cut every ten years?

Col. LOGGIE.—It is only in certain sections that they do that. It is only in a few places that the spruce is so fast growing as that. I was speaking of Nashwaak, and Mr. Gibson, the owner of that property, operates over the same ground every ten years and gets a good proportion of logs eighteen feet long and ten inches at the small end. He practically gets as much lumber each time he goes over the ground.

Mr. STEWART.—It pays him to go back every ten years?

Col. LOGGIE.—When he cuts the merchantable logs it lets the air and light get in which makes the growth considerably faster.

The CHAIRMAN.—About what area would he go over and about how much would he take out?

Col. LOGGIE.—His average cut is abqut twenty-five or thirty millions per annum. He has cut over a thousand million since he has been lumbering at Nashwaak.

Mr. STEWART.—What area is his forest?

Col. LOGGIE.—225,000 acres.

Dr. CLARK.—There was just one point that I would like to call attention to, and which I would like to hear discussed and have the opinion of the association on, as well as the opinion of the lumbermen from the west.

The government of British Columbia has recently doubled the ground rent and has also increased the stumpage rent. The ground rent has been increased from four to eight dollars. I think that is bad policy.

Mr. STEWART.—From four to eight dollars a square mile?

Dr. CLARK.—Yes. By putting the ground rent high the tendency will be to force the lumbermen to cut more, so that he can get his lumber off and abandon the land. On the other hand, if you put the increase on the stumpage you tend to conserve the land. I think the west is just now suffering from over-production, and this increase of the land rent would be to force them to cut as much as they possibly could so as to clear their limits up as quickly as possible. I am very strongly of the opinion that the ground rent should be kept low and not increased in any way, and that any increase that must be made should be made upon the stumpage, then the government interests and the lumberman's interests will both be conserved.

The CHAIRMAN.—If there is any British Columbia gentleman here we would be glad to hear his views on the subject.

No. 5.—The presence of large tops in a slashing perpetuate the danger from fire after lumbering for many years. These tops, being propped up from the moist soil by their branches, decay very slowly. [48

Mr. JONES.—I think we would be inclined to agree with the principle raised by the last speaker, but what he says is not the custom in our country.

In the railway belt, of which we heard so much this morning, the rental is five dollars a square mile. As soon as you get out of that—the land east of the Cascades costs you $115 a square mile. That is for a special license. To lease-holders I think it is fifteen cents an acre, which would be $96 a square mile. The dues are 50 cents per thousand when cut. This is the same all through.

Well, the result of that is we are holding on to our Dominion timber and cutting our provincial as fast as we can and letting it go. I do not think that anybody has come to the conclusion that he is going to go over the limits a second time. It is a comparatively new business and we have figured anyway that once we have cut it clean, and take off all the stuff that will make ties, we are about through with it.

It may be that our experience will be the same as that of the people down here, and that if we want to go over the limits again we will find them nearly as good as the first time. I do not know whether this will be the case, but the way we feel about it now is that once we have taken off all that is worth taking off we are just about through with the place.

A MEMBER.—They would not be worth a great deal if you had to pay the increased ground rent.

Mr. JONES.—Well, if we go over them again it will be our Dominion lands that we will go over and not the provincial, because we cut all of our provincial as soon as we possibly can and as close.

Dr. CLARK.—Under some circumstances it may be as high as $160 a mile, that is 25 cents an acre.

Mr. JONES.—The special licenses are $115 east of the Cascades, and $140 west. Of course the land west of the Cascades carries a much heavier stand of timber, and consequently it is worth more. Then the leaseholder's rental is twenty-five cents an acre unless you are cutting a certain capacity, in that case it is reduced to fifteen cents.

Mr. CHOWN.—When the land is cleared will it be classified as timber land, or as settlers' land?

Mr. JONES.—As far as most of the timbered land is concerned, I would not give fifteen cents an acre for it. It is worth absolutely nothing when you cut the timber off it, except as scenery. It is very handsome.

The CHAIRMAN.—I do not know whether there has been any change in the regulations with respect to the land in British Columbia or not. A year or so ago lands were sold by public tender, and went to the highest bidder. The only Crown dues were so much a mile, which was reduced if a mill of a certain capacity were erected. I think it was reduced to $96 a mile.

Mr. JONES.—That was west of the Cascades.

The CHAIRMAN.—And if the lumber was shipped from the province the dues were rebated one-half.

Mr. JONES.—Not enforced. Those were the regulations with regard to lease-hold, but the big majority is held under what is called a special license. Out there there is no objection to pay the rental.

The CHAIRMAN.—Of course this question of a high ground rent is a very vexed one. Whether it shall be high rent and low dues, or high dues and low rent.

In the province of Ontario we have our ground rent fixed, by recent sales at five dollars a mile. We sold one limit at any rate for which we got $31,500 bonus per mile, and then the licensee was subject to a royalty on the cut of timber. I apprehend that they would have rather paid a very high ground rent, and have fifty cent dues, than been subject to that bonus or royalty on the cut.

Mr. KNECHTEL.—I would like to say a word in regard to the matter of cutting timber to a diameter limit. There is a commonly accepted notion that if you go into the forest and cut all the conifer timber down to say ten or twelve inches diameter, you can go back after a certain period and make a similar second cut, getting as much timber as at the first. Then again after a time you can make a third cut and get as much timber as before, and so you can go on in that way for ever.

I believe that to be a fallacious notion, and I believe it for this reason. The seeding of the conifer trees is not going on sufficiently rapidly to keep up a forest lumbered thus periodically.

In our forests in New York, and in the forests in New Brunswick—I am familiar with Canada to a certain extent, being a Canadian,—there is a mixture of timber, hardwoods and conifers. The hardwoods have several advantages over the conifers. They seed more often, and they will germinate and grow anywhere in the forest, but the conifers need good mineral soil. The hardwoods do not need such good soil conditions, and they are more resistant to fire, but their greatest advantage lies in their ability to sprout from the root. If you cut down a spruce, or a pine, or a balsam or a hemlock, to replace it another must grow from the seed, while if you cut down a maple or birch, or chestnut, or almost any other hard wood, many may spring from the root.

Four years ago I made a study for the United States Bureau of Forestry in regard to the seeding of the commercial species of trees, in the Adirondacks. This study was made in the primitive forest, in township 5 in the Adirondacks.

I had two boys with me to assist me, and we went into the woods and selected quarter acre patches here and there. When we came to a place where I wanted to make a study, I had one of the boys stand in the forest and the other ran out a tape line fifty-nine feet. Then we blazed the trees around at a distance of fifty-nine feet from the boy who was standing in the woods. This gave a quarter of an acre circle.

Then we marked off in this quarter acre eight squares, fifteen feet on the side, and set stakes at the corners. The boys then pulled up all the little trees that were on

these squares and brought them to me. I separated the species and divided each into three classes, which I called 'Germinated,' 'Seedlings' and 'Juvenals,' according to size, and recorded the number in each class, making note of the conditions under which they grew.

We were at that work for over a month, and I finally came to this conclusion: In that neighbourhood where, it should be stated, there is much shade and much duff on the ground, the pine and spruce and hemlock were practically seeding themselves only where there was mineral soil and on old rotting logs where, I suppose, they got the proper moisture to exist. The hardwoods, on the other hand, were seeding themselves almost everywhere—on the rocks, on the mineral soil, on the leaves and even in the moss.

It seems to me that cutting down to a diameter limit must remove the conifers from the woods, especially if we leave the hardwood, unless we can make satisfactory conditions for the succeeding ones artificially.

In Germany, where I have recently made a tour, they have endeavoured for years to bring about natural seeding of the spruce, and they have told me there that they have not yet succeeded and are dependent for their coniferous woods (excepting the balsam, which is fir over there) on raising their trees in nurseries and planting them out in the woods.

Another method that they have adopted is what they call 'seed spot method.' They go into the field and hack up spots each about a metre long by half a metre wide and sow a few seeds there. The spots are placed about a meter apart. They do not depend at all on the natural seeding of the spruce. They say that the pine will reseed itself not very badly, but they also depend on their nurseries for the culture of that tree.

Dr. SCHENCK.—The rumours relative to the possibilities of timber reproduction seem rather vague and are, in many cases, coloured by prejudice. It seems to me that an actual growth of 1,000 feet per decade and per acre is rather high. Possibly the lumberman, in the case at issue, had removed at the first cut only trees of 18-inch diameter and over. At the second cut, ten years later, when the stumpage prices had risen, he was justified to remove trees of 12-inch diameter as well. The next time, at the end of the second decade, he is apt to cut down to a diameter limit of 6 inches only, and so on, even small stuff being then of value.

In Germany, where the forests are particularly well cared for, the average production in the state forests does not exceed 65 feet board measure per acre per annum, or 650 feet per decade of years.

I cannot imagine that the forests of this country are much more productive than the woods of the old country, so carefully husbanded.

Obviously, forest soil in this country is better, or averages better, than it does in the old.

You will further admit that in a number of well described cases the reproduction of white pine has been as much as 300 feet board measure per acre per annum for a limited number of years.

The production in feet, board measure, is very large at the time at which the poles measuring from 4 inches to 12 inches diameter at chest height develop into logable trees.

On the other hand, the production during the early stages of a forest, when it is composed of seedlings and small saplings only, expressed in feet, board measure, is nil.

Thus, it seems to me that an average production of 1,000 feet, board measure, per decade on an acre of ground is an exaggeration in which we should not indulge.

It is certain that in British Columbia the growth is very much faster than it is here in the east or than it is abroad.

To judge from the 'fish stories' which I have heard last night, in conversation with a number of gentlemen hailing from the west side of the Rockies, phenomenal productions and re-productions are possible in the western province.

If these 'fish stories' are true, then I am prepared to believe that in British Columbia 10,000 feet board measure, as an average annual yield from an average acre, lies within the reach of possibility.

In furtherance of Mr. Knechtel's remarks, I beg to say that I have lived in the fatherland for many a year, and I have traversed the woods of the old country on many a trip, under excellent guidance.

The forest ranges in which splendid natural reproduction of spruce can be seen in the old country are more than numerous.

For millions of years Nature has produced spruce in the old country, and mixtures of white pine, spruce and hardwoods in the new.

Do you think that Nature will stop producing in the twentieth century?

Personally, I believe that Nature will do the same thing in the new century—or will try hard to do it—which she has done for thousands of preceding centuries.

Possibly, helped by the hand of the forester, Nature may even improve upon her old ways during the present century, producing a greater quantity of conifers than ever.

In western North Carolina it is easy to produce white pine from self-sown seed.

Yellow pine is entirely reproduced by these means and, in the management of the Biltmore estate, I never incur any expense within the woods on that score.

Similarly, the reproduction of the tulip tree (white wood), merely from self-sown seed, is easily obtained. I must confess, on the other hand, that I have been unfortunate in securing a reproduction of oak and of chestnut by seeds, naturally planted, without human aid. The reason may lie in the fact that the humus in the forests has been destroyed by fires and that the seeding capacity of the trees is checked on impoverished soil; that the weeds on the ground are heavier now, owing to forest fires, than before. I can offer theories of explanation only, but no explanation in which I take confidence myself.

Generalizations in forestry are very frequently met, each observer judging the whole continent from the facts existing in the locality with which he is best acquainted. I warn you from jumping at conclusions on the basis of local evidence.

Mr. STEWART.—Perhaps I might be able to reconcile the different views which seem to be held by the speakers regarding this subject.

I remember at one of our committee meetings we had a discussion over the growth of spruce. Sir Henri Joly de Lotbinière put an example before us, saying that it took about ten years to grow one inch in diameter. The lieutenant governor of New Brunswick cannot be here, unfortunately (as Colonel Loggie said), but if he were here I think he would be able to tell you that it is possible to produce one inch in one year, and that he has done it on his limits in New Brunswick. I understood at the time that they go over his limits about every ten years.

He afterwards sent to my office an exhibit from his limits, showing about three-quarters of an inch per annum, that is taking the two sides on the measure. The average would be over half an inch, and nearly three-quarters of an inch in diameter. Sir Henri Joly de Lotbinière has counted from the interior and the growth is slow. Governor Snowball's was from timber cut where the moisture was very great and where the growth was very fast.

I just mentioned this to show that perhaps the two views are not altogether irreconcilable.

Mr. KNECHTEL.—I think Dr. Schenck has probably misunderstood my position. I contend only this, that this practice of going into the woods and cutting to a diameter limit periodically, as the lumberman does in Canada and in New York, will not give a permanent supply of conifer timber. Dr. Schenck tells us that he gives artificial conditions for regeneration. That is a different question altogether. I do not know where he found the natural regeneration of spruce so good in Germany, for I was all through the mountains, the Erzgebirge, the Harz, the Thuringian forest, the Vosges, the Odenwald and the Black Forest. I travelled thoroughly over the country and did not see it. I also had excellent guides—the forstmeisters themselves who have charge of these forests—and I inquired particularly concerning this point at Sulzburg, where Dr. Carl Phillip is in charge, and there got definite information that the spruce is a failure so far as natural regeneration is concerned—not an entire failure, but that it is not sufficiently reproductive. I think that explains my view of the matter.

Dr. CLARK.—In regard to this matter of the natural regeneration of the spruce, I think that both the gentlemen who have spoken have stated the facts correctly, that is, in Germany you can find places where the spruce reproduces itself, you can find other places where it is not so satisfactory.

I wish to say a word in regard to some natural reproduction of white pine which has come under my observation.

About two years ago I was making an examination of a large tract of pine land in New Hampshire, which had been lumbered over about 60 years ago. The best of the timber only was then taken. The usual after lumbering fire swept through the slash

burning the brush and the needles from the surface of the ground, also killing all small trees. The large cull trees remained, however, and seeded the ground. The resulting stand was as fine as one could wish. The owners are now cutting this second growth and are getting an average of about forty thousand feet, board measure, 'rough edge' or 'round edge' per acre. This is equivalent to twenty or twenty-five thousand feet, board measure, of square-edged lumber. This shows an average annual production of 400 feet B. M. per acre per year for the sixty years. The soil was a fine deep sand and conditions were otherwise favourable for white pine growth.

I agree entirely with Dr. Schenck that nature works the same in the twentieth century as she did in the eighteenth, or the first century. I am of the opinion that if the lumberman gives her a fair chance she will continue to do the same as she has done for thousands of years. But if the lumberman goes in and cuts the pine all, and the pine only, there can be only one answer by nature. The inferior and weed trees have possession and the next crop is bound to be greatly inferior. If we maintain the conditions nature will maintain her good work; if we improve on the conditions the result will be improvement in the crop and *vice versa*.

Mr. E. G. Joly de Lotbinière.—Dr. Schenck's and Mr. Knechtel's remarks, as to the natural reproduction of white spruce are of a nature to make one feel that conservative forestry is insufficient to ensure the perpetuity of our spruce forests, even when cuts, at a reasonable diameter restriction, are made at intervals of from 10 to 15 years. I feel that it is presumption on my part to differ from two such well known authorities, who have given the matter such careful study and yet I humbly maintain, that under certain conditions, a spruce forest may be cropped to advantage every 15 years, without endangering its perpetuity.

The principal condition to attain this end is the strict enforcement of a rational felling diameter.

Such a course has become very difficult to put in force since the pulpwood industry has assumed such enormous proportions. Nature, with a bountiful hand, has stocked our forests, in most sections of the country, with abundant material fit only to be converted into pulpwood. It is but right that advantage should be taken of this, but in doing so, every possible care and precaution should be taken, so as to leave a sufficient quantity of young timber of proper dimensions on a tract, to replace within a reasonable number of years, that which has been removed.

The Crown Land regulations of the province of Quebec, permit the felling of white spruce at 11 inches on the stump; trees of other descriptions at 9 inches, but black spruce, balsam, hemlock and other timber fit for pulpwood, may be felled at 7 inches on the stump.

I will not attempt to criticize at the present moment these diameter restrictions, for if they were rigorously observed, sufficient timber would be left to ensure a future crop, within a reasonable number of years, but where white and black spruce are felled together, piled or driven together and cut into pulpwood and corded together, it is practically impossible to distinguish the white spruce from the black and unscrupulous lumbermen are in a position to devastate a tract with impunity.

The whole question, as I said before, depends on the strict observance of the diameter restrictions. If they are carefully followed a new crop of valuable timber should reward the conscientious and conservative lumberman after a lapse of 15 years.

We have lumbered on our limits for considerably over half a century. The pine has practically disappeared, as the necessary conditions for its natural renewal have never existed, but the spruce stands by us and at intervals of 15 years, one is sure of finding a paying crop, on all sections that have been previously carefully worked.

We do our best to prevent the felling of white spruce under 12 inches on the stump and as long as we can hold to that felling diameter or even an 11 inch one, we confidently expect to secure paying cuts over our territory, at intervals of 15 years.

How could one expect to colonize a country if all the children that were born and growing up were done away with? It is the same thing with a forest; destroy the young growth and your forest comes to a speedy end, preserve it, and it will last you and those that come after you, for generations.

Mr. KNECHTEL.—Let me explain myself more clearly. If you go into a forest you will find large trees, medium sized trees, poles, smaller growth, and very small trees. Well, you take out the largest trees. In ten years you go back again, and the medium-sized trees will then be the largest. Perhaps they will not be quite as large as the ones you took out first, but they are the largest trees, and you take them out. Then you go back again ten years afterwards and you will find that the poles of the first time are the largest trees, and you take them out the same as before, and so on until you have removed from the forest all the growth that was there when you started to cut. Now, if the seeding has not gone on during all this time, there will come a time when you will have taken all the spruce out of the woods. That seems to me to be perfectly clear.

Now, I contend that in our forests this natural seeding is not going on with sufficient rapidity to perpetuate the conifer forests if they are lumbered periodically, and the seeding is what we have to depend upon.

Professor ROTH.—Just one word. I wish to join Mr. Joly de Lotbinière in giving hope. I do not believe in presenting any matter in a hopeless form unless you are obliged to do it.

Granted that we should run out of spruce in seventy-five years. Let us stick to this diameter limit which Mr. Joly de Lotbinière points out. Let us cut the first and the second and the third cuts, and at the end of the third cut, we will be ready to replace the spruce, if we have to.

By that time we shall have learned to replace it artificially cheap enough, so that we can go in and get another timber, as our friend Maxwell said, by the hundred million; but don't let us get scared. Let us see that those men who have had experience on that point give us the benefit of their experience, and let us say to them if they have been able to return in ten years and get another crop: 'Go ahead. Good for you; but stick to your diameter limit. Don't overdo the thing; be reasonable; and stick to the plan that you started out with.'

Mr. LITTLE.—Mr. Chairman,, in connection with this important subject, and the exceptional growth of spruce in some parts of New Brunswick, I may say that about a year ago I was told by one of the most extensive lumber manufacturers operating on one of the largest rivers of the province that he was unable to fully stock his mills that season owing to the scarcity of large spruce timber tributary to his operations.

About the stand of timber on Mr. Gibson's land, we are told that this is an exceptionally fine spruce district. It is about three thousand feet to the acre. Now, supposing we admit of the high average of five thousand feet to the acre, that gives one billion, one hundred and twenty-five million to start on.

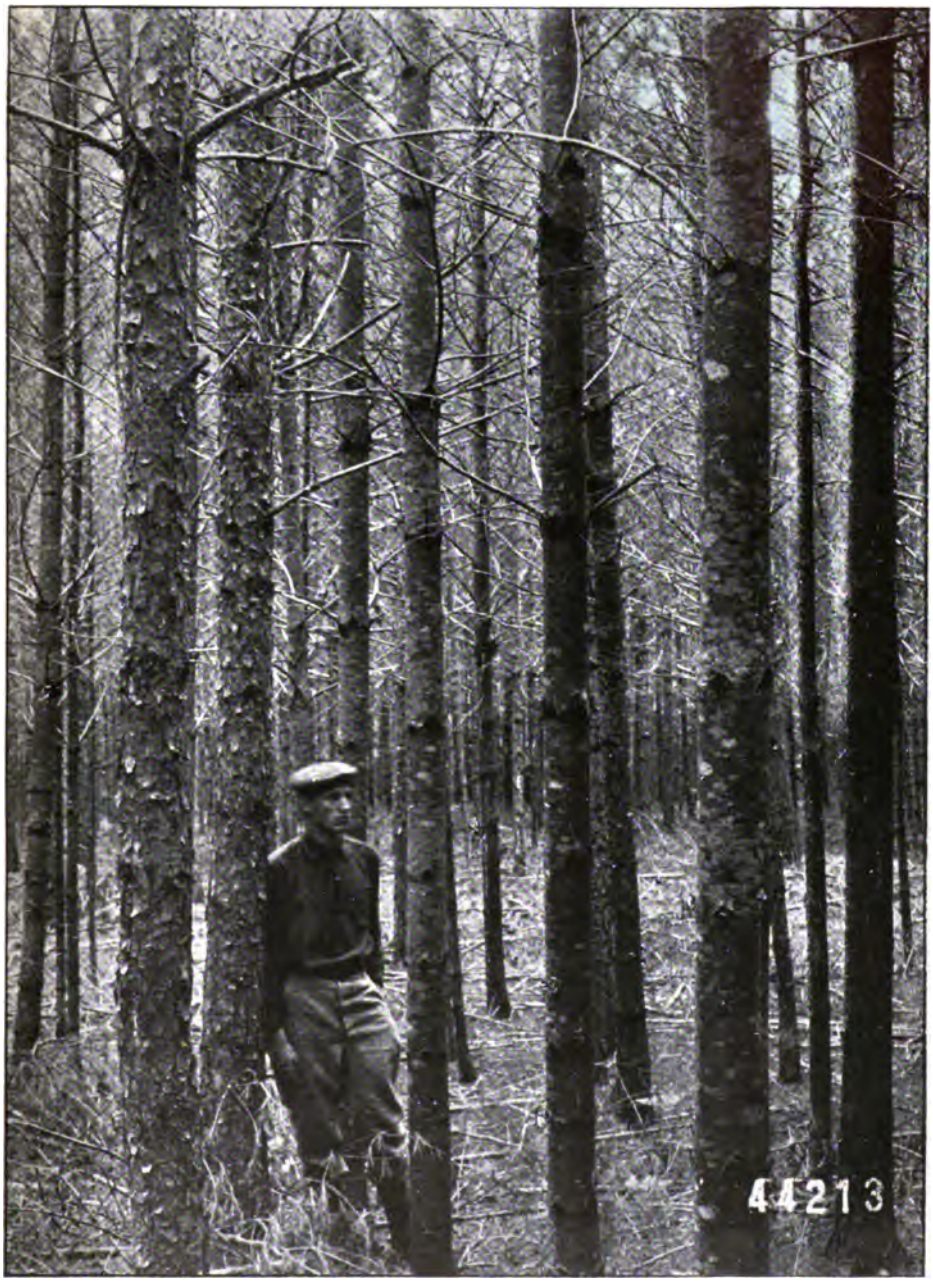
Now, when you start with one billion, one hundred and twenty-five million feet, you have something substantial to work on and may cut away at the large timber for a number of years. So that you may go back over the land for a second cut, say ten years thereafter and by lowering the diameter limit a few inches, get a lot of fair sized timber, but after the ground has been cut over a second time it will take a great many years to regain the sizes of the original growth of the timber.

People talk about the rapid growth of timber. I have had some experience in watching it, and I assure you that it is very seldom that you will find a spruce tree growing in our severe northern climate fifteen or eighteen inches in diameter which is less than one hundred years old, whereas those growing in the open where everything is cleared away for them, come up more quickly; but you take the mature growth of timber here, and you will very seldom find one of the tall trees of the forest which is less than from one hundred to one hundred and fifty years old.

Dr. BELL.—I am here, Mr. Chairman, rather to learn than to say anything, and until a few moments ago, when you were kind enough to ask me to address the meeting, I did not contemplate speaking, and I have not had an opportunity to prepare anything in the way of a paper, but I will say something about our northern forests.

Some of you are familiar with the conditions of the southern forests; possibly fewer have given any great attention to our northern woods, but I think I may claim to be fairly familiar with these, having travelled for many summers in the northern country from the Atlantic coast to the Rocky mountains. I may be allowed just to make a few remarks on two of my hobbies, one of which, as you perhaps know, is the distribution of the various species of forest trees. Another of my favourite subjects is forest fires.

As you are all aware, we have in Canada more than one hundred and twenty species of native trees, ninety-five of which occur east of the Rocky mountains and the balance west. Taking the United States and Canada together we have, I think, a total of three hundred and forty species of forest trees, which is a very extraordinary number and very much greater than is to be found in any other country in the world. Just to show you the great contrast between the wealth of trees in America and Europe, I might mention that there are only about thirty species at all common or conspicuous in Europe, and originally there were only some seven or eight species in the British islands. Whereas here, on this continent, the number, three hundred and forty, is something enormous in comparison with that.



No. 6.—An ideal stand of White and Red pine, self sown from seed trees. A fire ran through after lumbering at a favourable time for burning the brush without injury to the soil or the large seed trees, though all the smaller pine trees on the ground at the time of the fire were killed. The loss of these small trees is not serious so long as the seed trees remain.

The reason for this is not entirely explained so far, but perhaps it may be accounted for by the fact that the land of North America extends much nearer to the polar regions than does the land of Europe, and the forests of ancient time ranged extremely far north. During the glacial period the forests were compelled to move south.

The creeping back of the trees towards the north is the result of the disappearance of the ice-sheet. I have devoted a great deal of study to the geographical distribution of forest trees, and have come to the conclusion that only a certain proportion of those trees have yet got entirely back or reached the most northern limits possible. Some of them have done so, their seeds being carried by the wind, such as the poplars and birches. It is possible that these have reached their northern limits. As we know, when their seeds are ripe, being attached to a large mass of down, they are carried hundreds of miles; therefore, a single tree may seed an area equal to a whole county and plant the tree as far north as it is possible for it to grow. And those trees which are not provided with a good means of transport would travel northward somewhat more slowly, in accordance with the difficulties they encounter. Some coniferous trees have very large wings compared with the weight of the seed; others have very small ones, and those with the best wings fly the farthest. Other seeds have no means for transportation. Take, for instance, the nut-bearing trees, such as the walnut and oak; their means of spreading are exceedingly limited. The greater number of the seeds would have to remain immediately under the tree that produces them, or they might be blown a little way by the wind, but it would only be a very short distance, not more than the diameter of the top of the tree, that is, the spread of the branches, or they might be carried a little distance by squirrels or other animals which would take them for food. If an unfortunate squirrel were to make caches here and there, and then was killed by a hawk, for instance, his store of nuts would remain in the ground and some of them would germinate and you would have young trees a little distance away from the parent.

Amongst the proofs that some trees have not yet reached their possible limits, I might say that where the seeds of trees, or small trees themselves, have been carried a long distance north, they are found to grow about as well as at the place from which they were taken. Sir Henri Joly de Lotbinière has proved, for instance, that the black walnut will grow at Quebec, five hundred miles beyond its nearest home in Canada. The same experiment has been tried in many other instances; for example, in the county of Peterboro, around Ottawa and in the county of Lanark. This is a very large jump, several hundred miles at once, and it goes to show that trees may be suddenly moved and become acclimatized to the new conditions, and that the change is not necessarily fatal to them.

A great many other trees have been brought a long way north, and have been found to grow just about as well as at the parent home. At Ottawa city they planted numerous kinds of shade trees taken from Rochester, some of which were not indigenous to the Ottawa valley and yet they have grown just about as well as where they come from. The city council of Ottawa made a contract for these trees and it was stipulated that they should be brought from Rochester. The result has been very satisfactory. I need not enlarge on this point, if you will accept what I say in regard to the examples I have seen in a great many instances. It is a fact that trees will bear trans-

porting a long way north, and that they will flourish after they have been transported. I think the northern limit of a tree might be called the limit beyond which it will not ripen its seeds, and beyond which it can only be grown with artificial help. If it ripens its seeds every year, or even once in many years, it may be said to be within its northern limit.

I have given special study to questions affecting the northern limits of our trees, and have embodied the result in several published maps. On my revised maps I have represented to within a possible error, in some places, of five miles, the present northern limits of thirty of our species of forest trees, throughout the greater part of the Dominion. I might explain this map to those of you who are not familiar with it. The limit lines do not run parallel, east and west, but they seem to wander all over the map. Although the prevailing direction is approximately east and west, some of them run hundreds of miles north and south; others curve around in a way that is very difficult to explain to any one who has not given the matter some study. I think that it may be partly explained by the geological conditions which have submerged and afterwards raised the level of the land, so that the old shore lines were constantly changing.

I might just mention two trees to give you an instance of how trees may guide us in forming some idea of the geological changes which have taken place in this country. Take for instance the Banksian or jack pine, which rather shuns the presence of the sea, and the balsam poplar which seeks it. By using those two trees alone as guides, we are able to point out what parts of the country were covered with water a short time ago (geologically speaking). For instance, the Banksian pine is found in the interior of the Labrador peninsula and all through the provinces of Quebec and Ontario, at the greatest distances from the sea, and on elevated lands, these elevated portions marking the islands and mainland that represented this continent a short geological time ago. The balsam poplar is found in the outer portions of the Labrador peninsula, but not in the centre. It is found around Hudson bay, and to the westward. Whenever we come near the sea we find these trees.

There is another point of great interest in regard to the distribution of trees, that in certain regions or along certain zones you can find areas that contain a given tree, and other areas which do not contain it. For instance, if you travel towards Hudson bay, you do not go very far before you get beyond the limits of certain species, such as the black ash, the American elm, and some others, but after crossing the height of land, and going perhaps a couple of hundred miles beyond the last examples you had seen of these trees, you will suddenly come upon them again. This shows that the climate is better adapted to them there, than the climate south of it, on the height of land.

There are many instructive circumstances which we might deduce from the study of the distribution of trees. The Banksian pine is perhaps the only tree that we can claim to be Canadian. It certainly does extend its limits into the United States in some directions, but the occurrence of this tree may be said to be mostly within the limits of Canada. All the other trees of Canada extend into the United States very largely.

A good deal has been said about forest fires caused by human agency. I am of the opinion that probably the greater number of those occurring in the northern forests are caused by lightning. Before the advent of the woodman the fires were due to lightning. There are some Indian traditions that they have occasionally been caused by meteorites. It seems plausible that a red-hot meteorite falling in the forest in the dry season might set fire to the moss, and spread like a fire caused by lightning.

The Banksian pine, I think, proves that forest fires have been going on from time immemorial. This tree has the strange habit that the cones must be scorched, before the seed will escape. I have seen large trees covered with the cones of many different years, and of all these not a single one had opened, but the moment they were scorched, they would open widely and allow the seeds to go. Some of them might have lain for a hundred years until this fire reached them, and then the seeds would come out just as fresh as last year's. It is difficult to explain the exact method, but it seems to me to have been a long process of evolution, and this peculiar habit proves, I think, that forest fires have always been occurring in past ages.

It is quite reasonable to suppose that those fires originated from lightning, and other natural causes. As a matter of fact even now, in the summer time we read of houses, churches and barns being set on fire by lightning. Professor Brock's paper stated that the writer had seen four cases of fires started by lightning in one day. I also have seen a couple of cases myself. I would think it very strange if it were otherwise. The same ground that would be struck by lightning when inhabited, would be struck in the same way if it were in a state of nature, and the lightning would have the same effect. I have often seen forest fires burning during the summer, and no white man or Indian had passed that way who could possibly have started them. That being the case, what could have caused them but some natural phenomenon? I have studied the matter of the forest areas that have been burned over in the Dominion of Canada, with considerable care. These fires have been very destructive, and the whole country is looking for a means of preventing or overcoming them.

In regard to the length of life of our conifers I may say that I regard the white spruce as having a growing life of from one hundred to one hundred and forty years, whereas black spruce has a growth of one hundred and fifty or one hundred and seventy-five years; tamarack, of one hundred and seventy-five or two hundred years.

Speaking of tamarack, I am reminded of the effects of insects in our forests. About 1893 or '94, the imported saw-fly came up from the direction of New York and got into the forests north of the Ottawa river. In a year or two it reached James bay, and killed the tamarack throughout that district, which was only able to live three or four years after it was first attacked by the larvæ. The young leaves were all eaten. The same thing was repeated the spring after, and the one after that again. The fourth year, very few trees showed any green at all, and the fifth year they were all dead. This destruction continued to spread to the centre of Labrador, and now it has gone pretty well all over the great peninsula, which is larger than all the countries of Europe, perhaps excepting Russia. Well, nearly every tamarack tree has been killed in that vast region, representing a loss of incalculable millions of dollars, wiped out in ten years by one species of insect. This will give you some idea of the effect that insects have upon forest growth.

The reason that those insects spread so rapidly, is the common one with all insects when they arrive in a new country, and that is, they have the ground all before them, and spread with enormous rapidity, having no enemies of their own class. Perhaps in a few years some other insect may arise and kill off the saw-flies, and so spare the tamaracks.

The CHAIRMAN.—I wish to announce that I have received a telegram from Senator Edwards, who was to have been with us, but who has been unable to come. He says that he is extremely sorry that he has to forego the pleasure of being with us, on account of a severe cold, and he gives us the most satisfactory piece of news that this association has had since its inception, I think—

'Sir Wilfrid Laurier, who takes a deep interest in forestry, expresses a desire to have a large forestry conference at Ottawa some time during the coming summer or autumn, and authorizes me to bring the matter before the conference now sitting at Quebec. I am satisfied that the Dominion government will render suitable aid to such a conference.'

For a number of years we have been endeavouring to create a strong public opinion upon the subject of forestry. We have been gradually but systematically making converts to our cause. The most recent and most notable convert (perhaps I should not say 'convert' because he was in our favour before) is Sir Wilfrid Laurier, and the fact that the Dominion government is interested in the work that we are carrying on, and that Sir Wilfrid has expressed his wish that we should go to the Capital and hold a conference there, and that he will render us all the aid and assistance that is necessary, is, as I said before, perhaps the most satisfactory piece of information that this association has ever had conveyed to it.

I think we ought to elect as president of this association some gentleman who can take this matter up and arrange with Sir Wilfrid when that conference ought to be called, and work out the details for the consummation of a very successful meeting.

We have with us all the provincial governments, and now we are assured that we have the Dominion government, and we also have the Governor General of the country with us. With all this, I do not think that the association was ever in a better position than we are in to-day.

Mr. STEWART.—I am very pleased indeed that this information has come at the time it has. I was aware of this before, but I did not feel at liberty to mention it here. I was aware of the fact that Sir Wilfrid proposed calling a meeting at Ottawa. He has told Senator Edwards of the fact and Senator Edwards has communicated it to us.

As our president has said, Sir Wilfrid is not a convert, he has been for several years interested in the work which we are doing, but recently he has taken a very lively interest in forestry. And now that we have the Governor General and the Premier both heartily with us I do not see that we could possibly be better off.

As has been stated in the directors' report, we called upon His Excellency and asked him to become patron of the association, and he not only said that he would be glad to do so, but that he would also be pleased to do anything that he could to assist us in the work we are carrying on. He even went so far as to say that he would throw open the ball room at Rideau Hall for a meeting, and would issue invitations.

Gentlemen, it is a very fortunate thing indeed that Sir Wilfrid has imparted this information to us, to go before the public at the present time.

THIRD SESSION.

Friday, March 10, 1905.

The meeting was caller to order at 10.30, the president, Mr. Aubrey White, in the chair. He said:

Unfortunately Dr. Longley has not been able to be with us, but he has very kindly sent us his paper on 'Forestry in Nova Scotia.' I would ask the secretary to read Dr. Longley's paper.

The secretary, Mr. R. H. Campbell, then read the following paper:—

FORESTRY IN NOVA SCOTIA.

HON. J. W. LONGLEY.

Attorney General and Commissioner of Crown Lands.

The quantity of land available for lumbering purposes in Nova Scotia has never been, and is not now, large. The province itself is small and a considerable portion of it has been cultivated and improved. In years gone by the government was in the habit of granting outright to lumbermen land for lumbering purposes at 40c. an acre and the grant was absolute and conveyed the fee simple of the land to the grantee. The larger number of the large lumbering concerns of Nova Scotia, such as Davisons, Alfred Dickie, Nova Scotia Lumbering Company, the Margaret's Bay Company, Pickles & Mills, Clarke Brothers, Benjamin and others are all carrying on their enterprises for the most part with land on which they are paying nothing, it having been obtained by absolute grant from the government at 40c. per acre. This system of granting in fee simple was terminated in 1889 and it was provided that each lot of timber land should be leased for twenty years instead of granted outright and the price was made 40c. per acre in the case of land on which the timber to be cut should not be less than 10 inches in diameter and a lease to meet the case of pulp wood in which timber could be cut at 6 inches diameter was to pay 50c. per acre. During the last session, 1904, the price for these leases was just doubled—80c. per acre for the timber lease and $1 per acre for the pulp lease.

The timber lands of Nova Scotia which are good, are very good, and the existence of numerous streams, lakes, &c., facilitates the manufacture of lumber and it has been shown by actual experience that the growth of timber will equal the amount cut by the lumbermen each year, provided that lumbering is carried on on a sound and economical basis. Large lumbermen in Nova Scotia cut only the larger trees in any one locality during the lumbering season, and then pass on to another, adopting the same principle, and the growth is such that in ten or twelve years another cut is available—the growth, under fair conditions, keeping pace with the cut.

The difficulty, however, has been that occasionally a great fire would sweep over the lumbering districts and destroy millions of dollars' worth of trees and very often leave the land in such condition that a fresh growth was either slow or impossible.

The problem, therefore, of preserving the lumbering industry in Nova Scotia is the prevention of fires. An Act to prevent forest fires has been on the statute book since 1883, but it has accomplished nothing because no machinery was provided for putting it into effective operation. Last year the government introduced and carried

through the legislature an Act providing for the appointment of chief rangers and sub-rangers in the different municipalities, the salary of the chief ranger to be paid by the government and the services of the sub-rangers and special time employed by the chief ranger to be paid by the municipalities out of a fund to be obtained by imposing a tax of ¼ of one cent per acre upon the holders of all timber lands of 1,000 acres and upwards. The act has been brought into operation in the municipalities of Annapolis, Digby, Clare, Yarmouth, Shelburne, Queen's, Lunenburg, Colchester and Pictou, and it is working wonderfully well, more effectively indeed than I had ever hoped. The chief ranger has been found a most effective means of preventing fires and of instantly and by authority aggregating forces to put out a fire immediately it is started. In the municipalities in which a chief ranger has been appointed no fires of any consequence occurred during the last season although it was an uncommonly dry one.

The Act provides that no bush fire shall be set without previous notice to the chief ranger and with his consent and this part of the Act is being cheerfully complied with by all persons clearing lands in these municipalities.

Reforestation is a matter which is engaging the attention of the government and of the Crown Lands Department. We should be glad to have any practical suggestions in that line, but not enough light and information of a definite character has yet been afforded to justify us in launching out in any large scheme in that regard. The department, I think, would be willing to bear the expense of a careful investigation by an expert in forestry, on the question of whether or not any practicable scheme of reforestation is possible in Nova Scotia.

We are also considering the propriety of reserving tracts of land at the head of navigable waters for special public services and it is likely that something definite in this line will be inaugurated at an early date.

This constitutes, I think, about all that can be said of a practical character in relation to forestry in Nova Scotia.

The extent of ungranted forest lands in Nova Scotia as set forth in the last Crown Land Report, is 1,516,631 acres. I estimate that the number of acres of granted land now being used for lumbering purposes in Nova Scotia would not be far short of these figures.

FOREST WEALTH OF THE PROVINCE OF QUEBEC.

J. C. LANGELIER, QUEBEC.

The census of 1901 shows that the land superficies of the province of Quebec comprises 218,723,687 acres. At the date of that census, 7,421,264 acres were under crops, in pasture, gardens and orchards, while bushes, rocks and marshes, or other untimbered spaces, occupied 1,560,960 acres, leaving for the forest an area of 209,741,463 acres, or 327,721 square miles.

Under the heading of 'Forests,' the census mentions only 5,442,204 acres. This number represents only the forest area comprised within the 14,424,428 acres of lands occupied in all the provinces and does not apply to forests situated outside of private lands, or lands held under title grants.

Conifers predominate throughout these forests; spruce, fir, pine, cedar and hemlock, enumerating them by order of predominence, form at least 75 per cent of the timber growth. Excepting white brich (bouleau) and tamarack, which grow as far as the northern boundary of the province, deciduous trees, or hardwoods, do not grow beyond the 48th parallel of latitude. The only exceptions noticed so far are a few places in the Saguenay district, and in the southern section of the Abitibi territory, where some yellow birch and black ash trees have been seen north of that latitude.

For the purpose of classifying them according to the prevailing growths, the forests of the province of Quebec may be divided into three very distinct regions:

1. The Northern Region;
2. The Central Region;
3. The Southern Region.

Let us examine each of these regions separately.

I.—THE NORTHERN REGION.

This is by far the largest of the three. It embraces all that portion of the province lying north of the St. Lawrence and of the 48th parallel from the intersection of this line by the river, a short distance west of the River Saguenay. The forests comprised within those limits cover an area of 162,749,788 acres, forming 77·58 per cent of the whole forest area of the province. This northern region embraces the territories of Abitibi, Mistassini, Ashuanipi, the county of Chicoutimi-Saguenay and the north-west section of the counties of Champlain, St. Maurice, Maskinongé, Berthier, Joliette and Montcalm—a superficies of 5,375,000 acres.

Black Spruce (*Picea nigra*), is the prevailing and characteristic growth of that region. It represents about 60 per cent of the conifers of commercial value. On the average, taking into consideration the burnt spaces, the wind-falls and the sections denuded by other causes, black spruce would certainly yield 2½ cords of pulp wood to the acre, equivalent to 1,500 feet board measure. At this rate, which is rather below than above the mark, the forests of the northern region could supply 406,874,470 cords of pulp wood, or 244 billions, 124 millions, 682 thousand feet board measure of lumber.

Those quantities, of course, include only the trees measuring seven inches in diameter on the stump, as the rules of the Department of Crown Lands do not allow the cutting of trees of a less diameter.

It takes less than thirty trees of six inches in diameter and sixteen feet in length of utilisable timber to form a cord of 128 cubic feet. Mostly everywhere those black spruce forests are very thick; in the most favourable places, the trees grow tall, close to one another, so much so, in fact, that 500, 600, 700 trees are often found in one acre of ground, which represents from 10 to 20 cords of pulp wood to the acre.

It may be added that throughout this region, where the land is higher and the soil deeper, there are many black spruce trees measuring ten to twelve inches across the stump, which materially increases the yield per acre.

As regards the number of trees, fir (*Abies balsamifera*), is nearly as abundant as black spruce, but the trees are not as tall and their yield in utilisable wood probably does not exceed 25 per cent of that of black spruce. For the whole of the northern region, this proportion represents 101,718,617 cords, equivalent to 61 billions, 31 millions, 170 thousand feet board measure.

The white spruce (*Picea alba*), will yield a much larger quantity of lumber, and 75 billion feet is certainly not an exaggerated estimate of the saw-logs which can be cut in this region, taking only the trees measuring eleven inches in diameter on the stump. Then there would still be left in the tops utilisable wood to make millions of cords of pulp wood.

In the southern section of the Abitibi territory, or over an area covering 15,000,000 acres, white spruce attains dimensions which make it equal to the finest timber of that kind to be found in the central and southern regions. In the course of his explorations, Mr. Henry O'Sullivan has seen trees measuring one hundred feet in length and twenty inches in diameter. 'White Spruce,' says Dr. Bell, 'is perhaps the most valuable tree of the district explored. It grows to a great size everywhere along the rivers and lakes, and although as a rule, it may be larger near their banks, where it often girths upwards of six feet, a considerable portion of the trees inland also attain a good size.' The timber is sound; as a rule the trunks run to a great height without branches and in every respect this white spruce ranks amongst the very best timber for the manufacure of first-class saw-logs. In this section of the Abitibi ter-

ritory, there is enough of that fine white spruce to make about thirty billion feet of saw-logs of superior quality.

Banksian pine (*Pinus banksiana*) is another kind of timber which grows in abundance throughout the northern region. It is chiefly used for making railway ties. Calculating at the low rate of only two ties per acre, on the average, there is enough of that kind of timber to make upwards of 320 million ties, or sufficient to make ties for 150,000 miles of railway.

Botanists describe Banksian pine as a stunted, short and branchy tree. This description certainly applies not to the Banksian pine of the Lake St. John and Saguenay district, where these trees grow to a considerable height and attain a diameter which renders them fit for the manufacture of saw-logs. In a shanty on the River au Rat, in 1898, a jobber cut a tree of this kind and gave ninety-one feet in length of utilisable timber, viz.: five saw logs and two ties. That tree measured fifteen inches across the stump and over seven inches at the top. In the burnt grounds and windfalls in the townships of Albanel and Pelletier, also in those of Dolbeau and Taillon, one can count by scores of thousands Banksian pine trees measuring from forty to fifty feet in length and seven to eight inches in diameter at the small end. The wharf at Tikouape, or St. Methode, is mostly all built of Banksian pine, fifteen to twenty feet long and eight to twelve inches square. At the Escoumains mills they sawed for many years Banksian pine logs, turning out good boards which were exported to the United States. Logs of this timber are still sawed by the mills of Lake St. John. Banksian pine ties are from year to year coming to the front and looked after to such a point that they can be transported by railway from Roberval to Quebec, a distance of 190 miles, and sold at prices leaving a good margin for profit. When there will be no more cedar to supply the enormous quantities of ties required yearly by railways, one of its most valuable substitutes will unquestionably be found in that Banksian pine, which the northern region is in a position to supply for a very long period.

The fine pineries of the Lake St. John country have been depleted by the Chicoutimi mills; but in other parts of the northern region there yet remains a good deal of this timber. The census of 1901 shows that during that year there were cut in the county of Chicoutimi and Saguenay, 54,182 cubic feet of square pine and 1,217,000 feet board measure of saw-logs of the same timber.

But it is in the Abitibi territory, from the height of land northwards to a distance of about fifty miles, that pine is found more abundantly. This area embraces about 6,500,000 acres which, at the minimum rate of 50 feet board measure to the acre, would yield 325,000,000 feet. This pine is scattered over all the higher lands and hills and could be cut profitably only in connection and simultaneously with spruce; but, nevertheless it is there, and in the high and rocky grounds surrounding many parts of the lakes, it could supply material for pretty extensive operations.

Cedar *(Thuya occidentalis)* is another kind of timber which grows more or less abundantly in the southern section of the northern region. As is the case for pine, it is in the Abitibi territory that it grows more profusely. The best is found around the lakes and along the river banks. The southwest section of the Abitibi territory alone could supply sufficient of that timber to cut at least twenty millions of ties, a couple of million cubic feet of square timber, eight to twelve inches square, large quantities of piles, telegraph and telephone poles, pickets and fence rails.

Of deciduous trees, white birch (*Betula papyrifera*) is by far the most abundant all over the northern region. It is seen everywhere and in many places it occupies the ground almost exclusively. Till now this birch has been used only for fuel and for making spools and some turnery articles, but the time is, perhaps, not far distant when it will be used for furniture and also for cooperage, to make barrels and kindred articles. In the virgin forests, where white birch is a primitive growth, many trees are seen girthing ninety inches and more (see Report of the Commissioner of Crown Lands for 1898, p. 92, French version), particularly in the lower part of the rivers Alex and Peribonka, where immense quantities of those large trees grow on the mountain sides and

No. 7.—A pinery where no seed trees were left. The after-lumbering fire destroyed all the small trees on the ground which were unmerchantable at the time of the lumbering, and in the absence of seed trees, the land lies almost wholly waste for many years.

on the higher lands. That big birch also grows in many places along the north shore of the Saguenay river. Below this river the forests of Cape St. Nicholas, on the St. Lawrence, are the best situated for the cutting of white birch to get lumber for furniture. The harbour of St. Nicholas affords all the desirable accommodation for crafts of the largest tonnage, and the forest of large birch which surrounds it could supply in comparatively exhaustless quantities big logs of the best description. That fine large birch is also found in the southern section of the Abitibi territory. Along the Bell, or upper part of the Nottaway river, there is enough of the fine big birch to cut millions of saw-logs. When this territory is made accessible by the construction of railways, this timber will in all probability afford material for large operations.

Poplar (*Populus balsamifera*) and aspen (*Populus tremuloides*) constitute another growth which is also very abundant throughout the forests of the Northern Region. There are remarkable groves of large aspen between the rivers au Rat and Mistassibi in the county of Lake St. John. Many of these trees attain a diameter of twenty-four inches, but the general average is between fifteen and eighteen inches. This timber is sound, remarkably free from black veins and knots and would yield lumber of the best quality. However, the finest timber of this kind grows in the Abitibi territory, where it attains a diameter of thirty inches and a length of fifty and sixty feet without branches or knots. In the forests of that district, there is enough of this big timber to cut about ten billions of feet B.M., which might be used for making furniture and packing cases. It might also be used to great advantage in the manufacture of soda pulp. There is no other place where this industry could get its raw material as easily and so cheap, were these forests made accessible by the construction of a railway running along the Bell river, as far north as Lake Mattagami, a distance of about 150 miles from the height of land. Taking only a strip of five miles on each side of the river, it would be an easy job to cut from twenty-five to thirty millions of cords of that fine big poplar.

Tamarack, or larch (*Larix Americana*) is perhaps more abundant than poplar. The oldest trees have been destroyed by the grub of the larch saw fly (*Nematus Ericksonii*) which has spread devastation all over the Northern Region. Still the dried trees, which are not attacked by rot, could probably be used for several purposes, namely to make railway ties. In the Abitibi district there are enough of those dried trees to make millions of ties. At all events the young trees, a great portion of which were spared by the sinister insect, continue growing and ere many years will supply a large contingency of the forest industry.

The following is a very conservative estimate of the products which the forests of the Northern Region could supply to the timber business:

Saw-Logs.

Fine, white and red	325,000,000 ft. B.M.
Banksian pine	10,000,000,000 ft. B.M.
Spruce	35,000,000,000 ft. B.M.
Poplar	10,000,000,000 ft. B.M.
White birch (bouleau)	10,000,000,000 ft. B.M.
	65,325,000,000 ft. B.M.

Pulp Wood.

Black spruce	406,874,470 cords
White spruce	15,000,000 cords
Fir	101,118,607 cords
Poplar	100,000,000 cords
	622,993,077 cords

Railway Ties.

Banksian pine	320,000,000 pieces
Cedar	50,000,000 pieces
	370,000,000 pieces

Besides, and over that, fir would also supply several billion feet of lumber for domestic uses, when the country is settled, viz.: in the Abitibi territory.

Explorers have ascertained that yellow birch (*Betula excelsa*) grows as far north as fifty miles back of Betsiamites and as far back of Lake St. John, where they have measured trees of twenty-four inches in diameter. This tree also grows in the southern section of the Abitibi territory, also black ash (*Fraxinus sambucifolia*) and elm (*Ulmus americana*), but those trees are not in a quantity sufficient to make them of commercial value; they will be used for domestic purposes when the country is settled.

II.—CENTRAL REGION.

With regard to the variety and quality of the forest growth, this region is unquestionably the richest of the three. The forest covers an area of 31,649,632 acres, or 302,745 acres more than the whole territory of Nova Scotia and New Brunswick, whose collective superficies is only 31,346,937 acres. This Central Region is bounded to the south by the river St. Lawrence, and to the north by the 48th parallel, except in the upper part of the counties of Champlain, St. Maurice, Maskinongé, Berthier, Joliette and Montcalm, where the line bends southward in order to throw into the Northern Region about 5,376,000 acres of forest in which spruce, particularly black spruce, predominates.

All the kinds of commercial timber growing in the province of Quebec are found in this central region. The conifers include white pine (*Pinus strobus*), red pine (*Pinus resinosa*), Banksian pine, white spruce, black spruce, balsam-fir (*Abies balsamifera*), double-balsam fir (*Abies americana*), hemlock (*Tsuga canadensis*) and cedar. In deciduous trees, or hard woods, we have yellow birch (*Betula excelsa*), black birch (*Betula lenta*), white or silver maple (*Acer dasycarpum*), rock or sugar maple (*Acer saccharinum*), mountain maple (*Acer spicatum*), red or soft maple (*Acer rubrum*), white oak (*Quercus albus*), blue or swamp oak (*Quercus prinus*), red oak (*Quercus rubra*), hickory (*Carya amara*), butternut (*Juglans cinerea*), white ash (*Fraxinus americana*), black ash, white elm (*Ulmus americana*), red or slippery elm (*Ulmus fulva*), beech (*Fagus sylvatica*), basswood (*Tilia americana*), hornbeam (*Carpinus americana*), iron wood (*Ostrya virginica*), all the poplars and white or canoe birch.

White pine ranks first in the forests of this region, especially in the western part. Between the Saguenay and the River St. Maurice, this timber is thinly scattered amongst the other trees of the forest, of which it constitutes only a minute proportion. In those 5,004,180 acres of forest, it is probable that twenty-five to thirty million feet of white pine could be cut, of medium quality for the most part. It is more abundant in the western section of the St. Maurice territory, which contains at least 150,000,000 feet. There is undoubtedly as much on the Rouge, Lievre and Petite-Nation rivers. The richest pineries, and by far the most abundant are situated in the counties of Wright and Pontiac. They cover an area of 14,596,690 acres. On an average, they can yield 2,000 feet B.M. per acre, which would make a total of thirty billion feet. In those rich pineries, there can be counted by the score the localities where 10,000 feet and more could be cut upon one acre of land.

Red pine is one of the trees characteristic of this central region. This timber grows on the sandy and gravelly hills, which are numerous all over that district; it forms thick groves on the hill sides, where gravelly soil has accumulated and on the

dry sandy points jutting forth into the lakes. There is a sufficient quantity of this timber to supply seven or eight billion feet B.M.

Banksian pine grows nearly everywhere on the poor, rocky and gravelly lands, chiefly in the dry plains which have been formerly laid waste by fire. It is not as tall nor as good as the same kind of timber growing in the northern region, especially that of the Lake St. John valley, but nearly everywhere it is of a size large enough to make railway ties. It is larger and of better quality towards the north; 150,000,000 ties could probably be made out of this Banksian pine.

In the eastern part of the central region white spruce, as far as the number of trees is concerned, is the prevailing growth, particularly in the St. Maurice territory. It is less abundant in the Ottawa territory, but, as a rule, of better quality and larger dimensions. In the central region, and only from the first cut, there is enough of white spruce to manufacture sixty billion feet of saw-logs, taking only the logs measuring eight inches in diameter and up, at the small end. The tops of the same trees could yield upwards of fifteen million cords of pulp wood.

There is as much, if not more, of black spruce susceptible of being used for pulp wood, and the quantity of this wood, which can be cut in all this region, is over twenty million cords. The largest trees, which grow in comparatively large numbers in the more favourable situations, could be used to make masts and spars, frame timber and railway ties.

Fir is very common all over the damp grounds. Taking into consideration the fact that these trees are generally affected with rot, their yield may be estimated at 500,000,000 feet for saw-logs and 2,500,000 cords for pulp wood.

Hemlock scarcely grows beyond the 47th parallel of latitude. Hardly a few groves can be seen north of this latitude in the neighbourhood of Cape Tourmente. In the western section it grows as far north as the River Keepawa. Between these two extreme points the line marking the northern limit bends southward, describing a curve which passes south of the River Mattawin, in the St. Maurice territory. This tree, which rarely grows in groves, such as were formerly seen in the forests of the southern region, is generally large and tall. This timber could yield a couple of hundred million feet of lumber, or the equivalent in square timber. It could also produce a couple of hundred thousand cords of tanbark. Unfortunately it floats only with difficulty in the cold and heavier waters of the spring, so that it can be utilized by trade only at those places where the drive is not long or where the logs can be transported by railway.

Cedar grows throughout the whole of the central region. It is disseminated mostly everywhere in the forest; but on the lake shores and river banks it forms in many places almost impenetrable thickets. It also grows on the marshy depressions and damp flats between the hills and mountains, and it covers almost exclusively large areas of swampy lands. In the dense thickets many of these trees are small and stunted, but numberless quantities could make ties, telegraph poles and even square timber for railroad culverts. The largest trees are most invariably hollow at the stump; but these hollow butts are very profitably used in the manufacture of shingles. Fence rails and pickets are made out of the smaller trees. Calculating on the very conservative estimate of two ties per acre, on an average, there is enough of cedar in the central region to make upwards of sixty million railroad ties. Poles for electric wires would certainly reach about ten million, and the hollow butts would supply material to manufacture many hundred million shingles. Add to this several million feet of square timber for frames and culverts, myriads of pickets and fence rails, and you will have an idea of what the cedar growing in the central region can contribute to forest industry.

Hardwoods are scattered mostly all over this region, but in a much smaller quantity than conifers. Deciduous trees constitute about twenty-five per cent of the timber fit for commercial purposes outside of the lands occupied for colonization purposes.

Birch is the most numerous growth in the family of hard woods And in this species, it is yellow birch *(Betula excelsa)* which prevails. Generally speaking, the

finest timber of this kind is found in the St. Maurice and Ottawa territories. Black birch (*Betula lenta*), is less abundant, but usually of large size. In the Ottawa territory it attains the diameter of thirty inches. Calculating upon the low basis of 100 feet to the acre, and taking only the trees measuring twelve inches on the stump, there is in this region birch enough to cut at least 200,000,000 feet B.M. of good sound lumber.

White, or canoe birch of a size to make spool wood and saw-logs would yield 150,000,000 feet or 250,000 cords. This would be the yield of the primitive growth exclusively. The second growth, which occupies so large a portion of the lands devastated by fire, will ere long supply a much larger yield, and besides a practically inexhaustible supply of fuel.

Of the maples, the hard or sugar variety is the most abundant. It is also the variety which generally attains the largest size. Practically speaking, white or silver maple is not to be found in this region. Red or soft maple is seen mostly everywhere in swamps and low lands. These two kinds of maple could yield as much timber and lumber as yellow and black birch, and also enormous quantities of fuel for home use and for distillation in the manufacture of pyroligneous products.

Basswood scarcely grows in appreciable quantity east of the River Rouge. It is generally distributed amongst yellow and black birch and hard maple, viz., in rich soil. Many of these basswood trees measure twenty-four inches in diameter. Very often two or three trunks are seen shooting from one stump, and in this case the diameter is smaller. As regards height, it is about uniform for adult trees, which are invariably tall, usually forty to fifty feet without branches. The yield of this kind of timber in the central region should exceed 100,000,000 feet B.M.

The family of poplars is represented in the forests of this region by three varieties, the balsam poplar, the trembling-leaved poplar and the cotton tree or cottonwood. In the primitive forest and in the very old 'brulés' these trees attain a considerable size and can give good saw-logs. Cottonwood, which grows only in good soil and on the river flats, is always large. Were this timber floatable the forests of the central region could supply millions of logs to the lumber industry and about fifty million cords to the pulp and paper industry.

Larch grows in low, swampy lands, alongside with cedar, black spruce and black ash. It was a tree of great size and great value. It has been destroyed by the grub of the larch fly and has no longer any commercial value. But, even in its present condition, it can supply an abundance of good firewood.

White and black ash increase in quantity and size as they grow farther towards the western limit of the province. On the rich flats of the rivers Lièvre and Gatineau and their tributaries acres of white ash trees may be seen measuring fifteen to twenty inches in diameter and from forty to fifty feet of trunk, without branches. This timber grows in all parts of the Ottawa territory, even beyond the latitude of Lake des Quinze. Black ash is also observed in all parts of that territory; the trees are as high as those of the other variety, but of smaller diameter and more abundant in number. This tree grows in swamps and wet lands. At least 125,000,000 feet of both varieties could be cut in the central region.

White elm almost invariably accompanies ash, but grows also in many places where the latter is not found. This timber, as a rule, consists of fine, big and tall trees which dominate the surrounding forests. In the rich soil of the river flats, white elm grows with so great a vigour as to support on the same stump several large trees. Upwards of 200,000,000 feet of this timber could be cut in the central region, and if the upper part of the Lievre, Gatineau, and Ottawa rivers is ever made accessible by railway, the manufacturers of furniture and flour barrels will obtain therefrom a very considerable supply of raw material.

In the oak family, the red variety prevails, and would yield the largest quantity of merchantable timber. There are considerable groves of those trees in the Ottawa forests. Blue or swamp oak grows in many places in the valley of the Lievre river, where hardly any red oak is seen. The several varieties of oak are found in appreciable quantity throughout the Ottawa territory and could contribute perhaps ten million feet to the resources of the lumber trade.

Butternut is found in nearly all parts of the forests east of the River Rouge and south of the latitude of Lake Keepawa. There is enough of this timber, of merchantable dimensions, to cut 5,000,000 feet for the manufacture of furniture.

Beech is rather common in the forests of the central region, from Quebec to the River Ottawa. Some very fine specimens of this tree may be obtained in the counties of Argenteuil, Labelle, Wright, and in the lower part of Pontiac. The timber could produce over 15,000,000 feet of fine boards for making furniture and wainscoting, and as many railroad ties for exportation to France, where these ties are in great demand.

A recapitulation of the details given for each of the several kinds of timber standing in the central region gives the following totals:—

Soft Woods—	*Saw-logs.*	
White pine	30,325,000,000	ft. B.M.
Red pine	7,500,000,000	"
White spruce	60,000,000,000	"
Hemlock	200,000,000	"
	98,025,000,000	"
Hard Woods—		
Birch, yellow and black	300,000,000	"
Maple	300,000,000	"
Oak	10,000,000	"
Elm	200,000,000	"
Ash	125,000,000	"
Beech	15,000,000	"
Butternut	5,000,000	"
Basswood	100,000,000	"
White birch (bouleau)	150,000,000	"
Poplar	250,000,000	"
	1,445,000,000	"
Pulp Wood—		
White spruce (from tops)	15,000,000	cords.
Black spruce	20,000,000	"
Fir	2,500,000	"
Poplar	50,000,000	"
	87,000,000	"
Railway Ties—		
Banksian pine	150,000,000	pieces.
Cedar	60,000,000	"
Beech	15,000,000	"
	225,000,000	"
Poles for Electric Wires—		
Cedar	10,000,000	"
Shingles—		
Bolts and hollow butts	8,000,000,000	shingles
Culvert Timber—		
Cedar	5,000,000	cub. ft.

Add to all that myriads of pickets and rails for fences, inexhaustible supplies of fire wood, and you will have an idea of the wealth and variety of the forests of this central region.

III.—SOUTHERN REGION.

It is the less extensive of the three, as it embraces an area of only 15,381,890 acres, or 7·34 per cent of the total forest area of the province. And more than 25 per cent of these 15,381,890 acres are included in grants for colonization purposes. To state the facts as they are, it must be said that genuine forests exist only east of the Chaudière river, and that the portion comprised between the Chaudière and Lake Temiscouata will be exhausted within a few years, in so far as regards the production of saw-logs.

In this southern region cedar is the most valuable timber. It is the finest cedar to be found in the province, even in Canada, excepting the cedar of British Columbia. It attains colossal dimensions in the rich lands of the silurian and devonian formations of the Gaspé peninsula, where timber explorers have found trees measuring five feet in diameter on the stump and upwards of fifty feet of clean trunk, without branches. In those rich soils, cedar grows in such an abundance that it is hardly credible for one who has not seen it. In the evidence he gave under oath before the Colonization Commission, forest ranger Aquilas Lajoie stated that out of about two acres square of land, in the township of Hamilton, Mr. Robert Sinclair did cut two thousand cedar logs, besides some spruce logs, the average contents of the logs being one hundred feet each. Many of these cedar logs, fourteen to fifteen feet in length, measured forty-five to forty-eight inches in diameter on the stump and thirty to thirty-three inches at the small end. Mr. Sinclair also cut at the same place three hundred and forty pieces of square cedar ten by ten and twelve by twelve inches, ten to fifteen feet in length, and six hundred railway ties. These facts can be easily verified by looking at the stumps, which are there yet, near the front line of lot 10, in range 13, of Hamilton. On lot 5, in range 11, of the same township, the following cut was made during the same season, 1902-03, viz., two years ago: 25,000 cedar and spruce logs, 12,000 logs of yellow and black birch, also of large white birch (bouleau), all the logs containing an average of 100 feet each, and 6,000 cedar ties. On the next lot, No. 4, the cut gave 20,000 cedar and spruce logs, 12,000 birch logs and 4,000 cedar ties. The logs averaged 100 feet each.

The township of Humqui, in the Metapedia valley, is about 120 miles west of Hamilton, on the Bonaventure river. On five lots in Humqui, viz., lots 17, 18, 19, 20 and 21, in the eighth range, Mr. Joseph Theberge, a man of long experience, swore that the cut of timber would produce 55,000 cedar and spruce logs, averaging 50 feet each, and forming a total of 2,750,000 feet for 500 acres of land, or an average of 5,500 feet to the acre, leaving aside ties and pulp wood.

The Temiscouata district is just as rich. The scalers of the Department of Crown Lands measured in this district spruce logs thirteen feet long and thirty-seven inches in diameter at the small end. The same quality of spruce grows in the counties of Beauce and Compton.

The standing timber of this southern section can supply the following quantities to the trade:—

Soft woods—

	Saw-logs.	
White pine	75,000,000	feet B.M.
White spruce	12,000,000,000	"
Hard woods—		
Birch, yellow and black	100,000,000	"
Maple	50,000,000	"
Elm	20,000,000	"
Ash	5,000,000	"
Beech	10,000,000	"
White birch (bouleau)	25,000,000	"
Poplar	15,000,000	"

Pulp wood—

Spruce, white and black	20,000,000	cords.
Fir	10,000,000	"
Poplar	5,000,000	"

Railway ties—

Cedar	150,000,000	pieces.
Beech	5,000,000	"

Poles for electric wires—

Cedar	7,500,000	"

Shingles—

Cedar, logs and hollow butts	500,000,000	shingles.

Square timber—

Cedar, for frame and railroad culverts	25,000,000	cubic feet.

The black birch of the Gaspé peninsula, which unfortunately is but little known, is perhaps the finest wood we have in this province for cabinet work and the manufacture of fine furniture. In colour, it looks like mahogany, and it takes the finest polish. Maple is also a superior material for the manufacture of furniture. The large white birch (bouleau) which has but a thin coat of white sap, with all the core of a reddish colour, is a most desirable substitute for cherry wood. The beech growing in the Temiscouata district, especially in the vicinity of the lake at its northeast end, would also supply material of superior quality for cabinet work.

GENERAL RECAPITULATION.

Now let us recapitulate all the data given for each of the three regions, in order to make an approximate valuation of all that forest wealth. We find the following quantities:—

Saw-logs—Soft Woods.

White pine	30,725,000,000	ft. B.M.
Red pine	7,500,000,000	"
Spruce	107,000,000,000	"
Banksian pine	10,000,000,000	"
Hemlock	200,000,000	"
	155,425,000,000	"

Saw-logs—Hard Woods.

Birch	400,000,000	"
Maple	350,000,000	"
Oak	10,000,000	"
Elm	220,000,000	"
Ash	130,000,000	"
Basswood	100,000,000	"
Birch (bouleau)	10,175,000,000	"
Poplar	10,265,000,000	"
	21,650,000,000	"

Pulp Wood.

Black spruce	426,874,470	cords.
White spruce	50,000,000	"
Fir	113,618,607	"
Poplar	155,000,000	"
	745,493,077	"

Railroad Ties.

Banksian pine	450,000,000	pieces.
Cedar	260,000,000	"
Beech	20,000,000	"
	730,000,000	"

Poles for Electric Wires.

Cedar, number	17,500,000	"

Shingle Blocks.

Cedar	700,000,000	ft. B.M.

Square Timber, for Frame and Culverts.

Cedar	30,000,000	cub. ft.

Taken as a whole, those quantities are rather below than above the real mark, and of course, they include those trees only which have the diameter prescribed by the rules of the Department of Crown Lands.

VALUE OF THE FORESTS.

As regards the revenue to be derived by the provincial government under the form of stumpage duties, it is easy to ascertain this value, by simply multiplying the quantity of each kind of timber by the tariff rate, which gives the following result:—

White pine, 30,725,000 M. at $1.30	$ 39,942,500
Red pine, 7,500,000 M. at 80c	6,000,000
Spruce, 107,000,000 M. at 65c	69,550,000
Banksian pine, 100,000,000 M. at 65c	6,500,000
Hemlock, 200,000 M. at 65c	130,000
Hard woods, 1,110,000 M. at $1.30	1,443,000
White birch, 10,175,000 M. at 65c	6,598,750
Poplar, 10,265,000 M. at 65c	6,672,250
Pulp wood, 745,493,077 cords at 40c	298,197,230
Railroad ties, 730,000,000 pieces at 2c	14,600,000
Poles, 17,500,000 pieces at 5c	875,000
Shingle blocks, 700,000 M. at 65c	455,000
Square cedar, 30,000,000 cub. ft. at 2c	600,000
	$451,563,731

From this, deduct one-fifteenth part, for the timber growing in seigniories and on other lands held by private parties, whose timber is not subject to government stumpage, and there is left $421,459,482, representing for one hundred years an annual revenue of $4,214,594.

We have seen that the forest area of the province covers 327,721 square miles. Of those forests, about 84,000 miles are held in freehold by private parties and under license for the cut of timber, which leaves upwards of 243,000 miles available and to

No. 8.—A spruce slashing on a hillside where the soil is shallow and liable to be wholly destroyed if a fire occur during a dry time. Fires usually occur during dry times! The large amount of debris is not only a very great menace as regards fire, but greatly interferes with the development of any seedlings which may be on the ground.

be placed under license. At the comparatively low rate of $75 per mile, the bonus on the licensing of those available berths would bring to the provincial treasury $18,225,000, which spread over the one hundred years represents another annual revenue of $182,250.

VALUE FOR FARMERS AND WOODMEN.

Now let us see what the exploitation of that forest wealth is worth for our farmers and woodmen. For a basis of calculation, we will take the average current prices actually paid by lumbermen to cut the timber and haul it to the river banks, ready for the drive, or to railway stations, leaving out the wages representing the cost of the drive. With this data, we form the following table:—

White pine, 30,725,000 M. at $6	$ 184,350,000
Red pine, 7,500,000 M. at $5	37,500,000
Spruce, 107,000,000 M. at $4	428,000,000
Banksian pine, 10,000,000 M. at $3	30,000,000
Hemlock, 200,000 M. at $4	800,000
Hard woods, 1,110,000 M. at $5	5,550,000
White birch, 10,175,000 M. at $4	40,700,000
Poplar, 10,265,000 M. at $3	30,795,000
Pulp wood, 745,493,077 cords at $2.50	1,863,732,692
Railroad ties, 730,000,000 pieces at 10c	73,000,000
Poles, 17,500,000 pieces at 50c	8,750,000
Shingle blocks, 700,000 M. at $4.50	3,150,000
Square timber, 30,000,000 cubic feet at 10c	3,000,000
	$2,709,327,692

Divide this by 100 and you have $27,093,276 to be earned yearly by farmers and woodmen for 100 years. And then there are the wages to be earned on the drive, in the mills, and the freight to be earned by railways, which would foot up to about $15,000,000 a year.

Some will perhaps object that a large portion of this forest wealth is unavailable and consequently worthless, because the timber cannot be taken out of the forest by water.

This objection can apply only to the forests in the territories of Mistassini and Abitibi, for the rest of our forest domain is traversed in all directions by numberless rivers on which timber is driven to the mills, to the seashore and seaports, and to railways which carry it to the great centres of trade and commerce. In this respect few are the countries enjoying as good accommodation, as great advantages and as much facility as the province of Quebec for the removal of timber from the forest, particularly with regard to soft woods. The exploitation of these forests on a lesser or larger scale is merely a question of demand for their products and of necessity this demand should increase with time, population and the exhaustion of forests in other countries.

Now, for the exploitation of the forests of Abitibi and Mistassini is there not a bright prospect in the North-west Territories? Ere many years the five or ten millions of farmers who will have settled in these territories will want large quantities of timber and lumber for their buildings; the thousands of miles of new railroads which shall be built to carry the millions of bushels of grain raised in those vast territories will require scores of millions of ties and considerable quantities of timber and lumber. Are not the forests of Abitibi and Mistassini in a favourable position to compete for this trade? The timber and logs could be so easily driven on the Nottaway and Rupert rivers to the port at the mouth of these two great rivers and thence

carried by sea crafts to Fort Churchill, a distance of 900 miles. From Churchill about 350 miles of railroad, through a general level and very easy country, would take that timber and lumber to the centre of the best farming and wheat lands in those territories. Manitoba is striving to get a railroad built to York Factory, to connect with navigation on Hudson bay. If that project ever materializes would not that procure a desirable outlet for the forest products of Mistassini and Abitibi? Transportation by waterways is comparatively so cheap.

As regards Abitibi, there are four companies chartered to build railroads intended to reach James' bay through this territory, three from south to north, and one from east to west. In all probability the Grand Trunk Pacific will also run through that territory, and this should impart practical value to its forests. A piece of railroad about seventy-five miles in length, from Lake Victoria northwards, could bring the timber of that portion of Abitibi to the Ottawa river, on which it would be driven to the mills and railway stations on this river, and thence the lumber would be shipped in the same manner as the lumber sawn from logs cut in the Ottawa territory.

But to remain on the safe side, let us take exclusively what is actually available, viz., the forests of the southern and central regions, and only 30,626,676 acres in the northern region, comprising the upper section of the six counties of Champlain, St. Maurice, Maskinongé, Berthier, Joliette, Montcalm, and 25,250,876 acres of the most accessible woodlands in Chicoutimi and Saguenay. This brings down to 109,055,427 acres the forest area actually available.

At the conservative estimate per acre of two and a half cords for black spruce, one-half cord for white spruce tops, and one-half cord for fir, the following quantities of pulp wood could be cut on those 30,626,876 acres of wood lands: Black spruce, 76,567,190 cords; white spruce, 15,313,438 cords; fir, 15,313,438 cords, forming a total of 107,194,066 cords. Computing the white spruce saw-logs at only 500 feet B.M. to the acre, this territory would produce 15,313,438,000 feet of lumber.

Hard woods have a commercial value only so far as they are accessible to railroad transportation, either for the raw material or the manufactured. Under our present circumstances, not more than 20 per cent of our hard woods enjoy the advantage of accessibility to railroad transportation, and in order to make a correct estimate this must be taken into account. With all those deductions and restrictions, the actual contents of our available forests may be stated as follows:—

				Stumpage.
Saw-logs—				
White pine	30,400,000,000	feet at	$1.30	$39,520,000
Red pine	7,500,000,000	"	.80	6,000,000
White spruce	87,313,438,000	"	.65	56,753,735
Hemlock	200,000,000	"	.65	130,000
Birch	80,000,000	"	1.30	104,000
Maple	70,000,000	"	1.30	91,000
Oak	2,000,000	"	1.30	2,600
Elm	44,000,000	"	1.30	57,200
Ash	26,000,000	"	1.30	33,800
Beech	25,000,000	"	1.30	32,500
Butternut	1,000,000		1.30	1,300
Basswood	20,000,000	"	1.30	26,000
White birch (bouleau)	35,000,000	"	.65	22,750
Poplar	53,000,000	"	.65	34,450
	125,769,438,000			$102,809,335
Pulp wood—				
Spruce	148,870,628	cords at	$ .40	$59,548,251
Fir	27,913,338	"	.40	11,165,335
Poplar	11,000,000	"	.40	4,400,000
	187,783,966			$75,113,586

Railway ties—				
Cedar	220,000,000	pieces at $	.02	$4,400,000
Banksian pine	211,253,352	"	.02	4,225,067
Beech	4,000,000	"	.02	80,000
	435,253,352			$8,705,067
Poles for electric wires—				
Cedar	17,500,000	pieces at $	.05	$875,000
Shingle bolts—				
Cedar	1,300,000,000	feet B.M. at $	.65	$845,000
Square timber—				
Cedar	30,000,000	cubic feet at $	.02	$600,000

The total of stumpage dues amounts to $188,958,188.

Distributed over a period of one hundred years, this represents for the provincial government an annual income of $1,889,581.88 per annum in stumpage duties.

For farmers and woodmen the cutting of the logs and the preparation of the timber, delivered on the river banks or at the railway stations, represents the following amount of wages for men and horses:—

Saw-logs—		
White pine	$182,400,000	
Red pine	37,500,000	
		$219,900,000
Spruce		349,253,752
Hemlock		800,000
		$569,953,752
Hard woods	$1,340,000	
White birch	140,000	
Poplar	159,000	1,639,000
Pulp wood—		
Spruce	$372,179,570	
Fir	69,783,384	
Poplar	27,500,000	
		469,462,954
Railway ties		43,525,335
Poles for electric wires		8,750,000
Shingle blocks		8,450,000
Square cedar		3,000,000
		$1,084,781,041

Putting together the government dues and the wages of woodmen, the different kinds of timber represent respectively the following values:—

Kind of Timber.	Gov. dues.	Wages.	Total.
Spruce	$116,301,986	$721,433,322	$837,735,308
Pine	45,520,000	219,940,000	265,420,000
Fir	11,165,335	69,783,000	80,848,719
Cedar	6,720,000	42,200,000	48,920,000
Poplar	4,434,000	27,659,000	32,093,000
Banksian pine	4,225,000	21,125,335	25,350,402
Hard woods	428,600	2,190,000	2,618,600
White birch	32,750	175,000	197,750

In the total of $1,293,183,779, spruce forms 64·78 per cent and pine 20·52 per cent. Fir comes in for 6·25 per cent and cedar for 3·78 per cent.

The saw-logs, in government dues and wages, form a total of $674,312,287 for all, and the pulp wood $544,576,540, a difference of only $129,735,747, which clearly shows the possibilities of the pulp wood business.

Now, if instead of taking only 25,250,876 acres in the counties of Chicoutimi and Saguenay, we would take all the 87,494,628 acres of forest comprised in those counties, it would add to the quantity of floatable pulp wood 155,609,380 cords of spruce and 38,902,345 of fir, or a total of 194,511,725 cords, which should yield $77,804,690 in stumpage dues for the government and $486,279,312 in wages for woodmen, or a total of $564,084,002. Add this to the $441,962,954 given above for spruce and fir pulp wood, and you reach the phenomenal total of $1,006,046,956, representing the value of our floatable pulp wood in government stumpage and wages for woodmen, leaving aside over thirty million cords of poplar and all the black spruce and fir we have in the territories of Abitibi, Mistassini and Ashuanipi which comprise 69,879,160 acres of spruce forest.

The pulp wood of Abitibi and Mistassini is not actually available, as it will have to be taken out by railroads which are not yet built; but the wood of Ashaunipi is just as available as that of any other section of the province, as it can be driven to Hamilton Inlet, a good sea-port on the Atlantic, about 250 miles north of Belle Isle Straits. From Hamilton Inlet to the ports of the United Kingdom the distance is about 1,750 miles. There is a company lumbering on the Hamilton river, and running a large saw-mill at the mouth of Goose river, which debouches into the head of the inlet, which shows that lumbering operations are practicable in that district. The forests of Ashaunipi have an area exceeding 20,000,000 acres, capable of yielding 50,000,000 cords of spruce and 10,000,000 of fir pulp wood.

This territory of Assuanipi looks only as a parcel or a strip on the map of the province of Quebec, but its area exceeds by about 7,000,000 acres that of Nova Scotia, by over 2,000,000 acres that of New Brunswick, and it nearly equals that of the state of Maine, which comprises only 21,145,600 acres.

There are many large water-powers in Ashuanipi, namely the Great or McLean Falls, on the great Hamilton river, about fifty miles distant from the head of tide. Those falls are 302 feet high, and it is considered that they could develop an average of over one million horse-power.

All those facts may convey an idea of the possibilities of our province in regard to the pulp and paper industry, taking into account only that portion of its spruce forests which are accessible by waterways and practically available.

EVOLUTION IN THE VALUE OF FORESTS.

White pine, some thirty years ago, was considered as the only timber possessed of commercial value, especially for the export trade. Explorers sent out to value wood lands would not look at spruce, hemlock, fir, cedar, or even red pine, which they regarded as worthless, and classed them in the category of rubbish. By and by the latter rose in the estimation of the trade, and to-day it nearly equals white pine in value. White spruce came up next, and now ranks amongst the kinds of timber most sought for, even for export trade. One of our lumber kings, the Hon. Senator W. C. Edwards, who speaks from experience, does not hesitate to say that there is more money in spruce than pine, that he regards no investment in Canada as good as an investment in a spruce limit, and prefers it to pine. Another lumber king, Mr. J. R. Booth, made the following statement in his evidence before the Colonization Commission:—

'Formerly our explorers, that is the men we send to explore and report on the nature of the forest, would go round on the limit and report to us that there was a certain quantity of pine in such a part, and when we would ask them, what was on

the rest of the limit, they would reply, and that would settle it, 'Only rubbish,' meaning that it was of no value, and as a matter of fact, spruce at that time was of no value. To-day that very spruce on those limits renders a value equal, if not superior, to the value in that time of pine limits.

'To go a little further and to show you how the value of the forests has increased, let me say that at that time we did not put any value at all on red pine. Many years ago, after I had commenced this business, we would not have cut a red pine in logs, where we had only to cut it and pitch it along into the river or the lake and let it take care of itself; no red pine for the lumbermen at that time. Now, as we go along, wherever we can get spruce, we cut it just the same as we do the pine and the red pine too comes in now as well as the white one. The red pine is worth to-day as much as the white pine. I speak of that to show you the difference that a few years have made in the value of the forest.'

Cedar is another kind of timber formerly considered as of no value for commercial purposes and now ranking amongst the most valuable kinds of timber. 'That is a kind of wood,' says Mr. Booth, who speaks from experience, 'that will come forward as it gets better known. It is a wood of which railways will now get all their ties. A few years ago, you could not sell a single cedar tie to put in a railroad. A few years ago we commenced to put them to our line, (the Canada Atlantic Railway.) We considered that the railroad was well provided with them. To show you how the cedar tie is now valued, compared with that time, the Grand Trunk applied to me to see if I could supply them with cedar ties. I offered some tamarack ties, but word came back that none but cedar were to be bought by them. Now they use the cedar just the same as they used tamarack, and the cedar ties will last from 15 to 20 years, and the tamarack not more than five years. That shows the value of our forests. I look upon the cedar that I have upon my limits just as much as I do the pine. Cedar and what it is generally worth to us is not generally thought of by the casual observer. It is used for tubs, for ties; it makes the most reliable culverts on railways, it is used for telegraph poles, telephone poles and for the tubs needed in paper mills. We have no timber in this country to take the place of this kind of timber. Cedar is also used for fence posts and nothing can replace it. In the United States a cedar tie is more valuable than any other tie. These are some of the reasons that I say we have immense wealth at our command in our forests. If not only those that will sit down and think it over, but even if those that will give but a thought to it will pause and look around, they will see a great many different kinds of timber that we used to look upon as having no value, and we took to use them so fast too, they will soon realize what our forests will be worth in a few years.'

Some twenty years ago, the Hon. W. C. Edwards made the following statement before a committee of the Legislative Assembly:—

'I make the statement here, that I attach value to every green thing that grows upon a timber limit. As pine becomes less, I consider the value of other woods enhanced. I consider the pine, spruce, red pine, birch, maple, hemlock, tamarack and cedar of commercial value. Beech, I think, will come in too; white wood, or basswood, also. I regard it that all the timber on the limits will yet come in and be available as a commercial asset to the province.'

That prediction has been fully realized, with regard to soft woods formerly considered as having no commercial value, such as cedar, hemlock, fir, and black spruce, and it will also be realized with regard to hard woods, as they are made accessible by railroads.

A most remarkable instance of this evolution in the commercial value of our forests, is that regarding black spruce and fir. Not many years ago, black spruce, which attains but a comparatively small diameter and makes very poor lumber, was considered entirely worthless, and a lumberman talking of buying a black spruce berth would have been considered as *non compos mentis*, or out of his mind. To-day these same black spruce berths are looked after with the same eagerness and paid for at

much higher prices than white pine limits were twenty-five years ago. And I will venture to say that in many cases there is more clear money in the exploitation of a black spruce berth, where it is favourably situated, than there is in the exploitation of an average white pine limit.

THE PRINCIPAL CAUSES OF THIS EVOLUTION.

That the neighbouring states of Maine, New Hampshire, Massachusetts, Vermont and New York want timber from the province of Quebec, is a fact beyond serious contestation. Masses of statistics, of a more or less reliable character, have been published to prove the contrary. I will not worry in an attempt at refuting those statistics, but I will mention a few facts which will show the consideration which those statistics deserve.

The official trade returns show that we export yearly to the United States many millions worth of timber and lumber. If our neighbours have at home all the wood they want, why do they come here to get so much of ours and pay the cost of transportation, besides and above the intrinsic value of the wood ?

The same remarks apply to pulpwood. The census of the United States shows that in 1900 the American pulp and paper mills consumed 349,084 cords of Canadian costing on the average $6.50 a cord, and 1,160,118 cords of American spruce, costing on the average $4.81 a cord, or $1.69 less than the Canadian wood. This represents a difference of $589,942. Why would the American manufacturers pay us that difference, if really they can find at home all the pulpwood they want, of the same quality and as conveniently situated? They also bought from us 20,133 cords of poplar to manufacture it into pulp, besides the 236,820 cords they produced at home. That was not sufficient, however, to meet all the requirements and the pulp mills consumed 220,155 cords of inferior woods, as regards pulp making, such as yellow birch, hemlock and kindred stuffs. If they have at home all the good wood they require and growing in situations where it is available, why do they use those poor woods, which can only yield products of the lowest grade?

I would not like to be understood as pretending that the forests of the New England states and New York are depleted or completely exhausted, which is not the case; but I maintain that practical exhaustion is near at hand through a large portion of those forests and that another portion, well timbered as it may be, is unavailable on account of the absence of waterways to take the products out of the forest, or of its remoteness from railways and inaccessibility to railroad transportation.

Nearly one-fourth of the best forests of northern Maine is in this predicament. To bring that wood to the large mills of Rumford Falls, which control mostly all the cut of that timber, they would have to float it down the St. John river, and thence use railways to carry it several hundred miles inland to the mills, which is profitably impractical. As a matter of fact, some of the proprietors of these wood lands sell the cut of this timber to the St. John's mills, to which it is of easy access by water. This, nevertheless, materially lessens the possibilities of Maine, as a pulpwood producing state, and in this respect, it is the state which above all others is endowed with the largest resources. In 1900, if the census is correct, the pulp mills of Maine used 20,638 cords of spruce imported from the province of Quebec and for which they paid an average price of $8.24 per cord. During the same year, they used 265,359 cords of domestic spruce, which they got for $4.99 a cord, delivered at the mills, or $3.25 less than the Canadian spruce. Why would those mills pay $3.25 more per cord for Canadian spruce, if they have at home all the wood they want and of the quality they require ? Of the 196,180 cords of spruce manufactured in the Mills of New Hampshire, 87,139 cords, or 44·11 per cent, came from the province of Quebec. The mills in Vermont consumed 56,958 cords of spruce, of which 25,442 were brought from our province. The mills of the state of New York, representing

in number over 20 per cent of the 763 pulp and paper mills of all the United States, manufactured into pulp 505,154 cords of spruce, 141,729 of which was Canadian spruce. 45,227 cords of Canadian spruce were also used by the pulp mills of Indiana, Pennsylvania and Wisconsin. Besides the wood, the American mills purchase about ⅗ths of all the pulp manufactured in the province of Quebec.

All those facts show that the paper industry of the United States wants our pulpwood and that the demand from this source will increase at the same rate as the home supply decreases. I would not say that the American pulp and paper manufacturers cannot do without our wood, but I contend that they can do much better with it, and on this contention I base the opinion that the requirements of the American manufacturers impart to our forests of pulpwood a value which can only increase with time, if we take care not to bar that trade by unwise regulations or legislation.

Our pine forests stand nearly in the same position: their value shall of necessity increase in the same ratio as the exhaustion of the pineries in the United States.

Mr. George W. Hotchkiss, secretary to the Chicago Lumberman's Exchange, ranks amongst the men who are the best informed about this matter, in which his opinion is an authority. In 1888, he wrote as follows:—

'One hundred years ago, Maine, Vermont, New Hampshire, New York and Pennsylvania, could boast vast forests of white pine. West of the lakes, Michigan, Wisconsin and Minnesota, so late as fifty years ago, were unbroken in forest resources, and the white pine predominated.

'To-day Maine gives us some spruce and a little small sapling pine, such as would hardly have been sent for fire-wood in her palmy days of lumbering. Vermont, New Hampshire and New York may still boast an occasional clump of trees, but have lost all pretensions of lumber-producing regions. Pennsylvania has a few hundred million feet on the sides of the Alleghanies, but has dropped out of the list as a lumber producer. East of the Great Lakes nought remains (excepting the spruce forests of Northern and Eastern Maine) save hemlock and hardwood, and these in very limited quantities, insufficient to supply the home demand in a majority of localities. Michigan, Wisconsin and Minnesota are the last remaining resort for lumbermen east of the Rocky Mountains. Originally there was probably 150,000,000,000 feet B.M. in Michigan, but fifty years' work has reduced the supply to probably not over twelve to twenty billion feet, with an annual average cut for the past five years of not far from four and a half billions; and the cutting is so close as to exterminate all the pine timber on the tract operated upon. Wisconsin can hardly be estimated at over thirty-five billions, little more than would suffice to supply the consumption of the United States as a whole for one year.

'Minnesota, set down in the census of 1880 as having 11,000,000,000 feet B.M., an amount disputed by some as too high, by others as too low, if allowed to-day at 10,000,000,000 could furnish but one year's supply for the mills of the north-western pine producing states. In fact, if the mills of these three states were run to their capacity for six years there would be but little pine left for the seventh year's production. And these estimates of timber include the red and Norway pine which forms a noticeable percentage of the whole. In Michigan and Wisconsin there are still large quantities of hardwood, but it is not being cared for with that appreciation of its value which is desirable. It has, however, this advantage, it can be reproduced; pine can not.'

A few months ago the *Mississippi Valley Lumberman* published the following statement:

'The pine forests of Michigan have been consumed and their lumber product has ceased to be an important factor in the general market. The annual output from that state is now below a billion feet. Wisconsin mills still continue to manufacture about two billion feet of lumber annually. In our investigations to secure information upon the probable extent of the standing white pine in the northwest, we have compiled the following data for Wisconsin: In 1897 the Department of Agriculture of the United States government made a calculation of the white pine timber then standing in Wisconsin. This was based on estimates furnished by lumbermen. The research was

made as thorough as possible and conducted among the smaller producers as well as the larger manufacturers. From these estimates the standing timber in Wisconsin at the beginning of 1897 was stated at eighteen billion feet. The reports of the different mills which draw their log supply from Wisconsin timber show that there has been cut since that time 13,643,669,200 feet. Taking this amount from the eighteen billion feet standing in 1897 will leave the present amount of standing timber at only 4,356,-330,600 feet. A general survey of Wisconsin forests and of the reported holdings by the different owners of stumpage in the state makes these figures seem correct. If the mills continue to saw white pine as vigorously as in the past, Wisconsin will cease to be a white pine lumber producer within the next three years.'

If Minnesota had only eleven billion feet of white pine in 1880, as stated by Mr. Hotchkiss, there should not be much left now. In other words and compared to what there was formerly, practically speaking there is no white pine left in the northwestern states.

This exhaustion of the American forests accounts to a great extent for the evolution in the value of the forests of the older provinces of Canada. For want of pine the New England markets have accepted spruce; the same change has been going on for the last few years on the markets of the state of New York, and ere long it will also take place on the market of Chicago, which takes yearly about two billion feet of lumber.

The extension of our railway systems is also a great factor in the enhancement of our forest values. Accessibility by railroad has already made available a great part of our hard woods. Several roads are projected which will run east and west through the central region, with terminals on the Georgian bay, where they will connect with steam navigation on the Great Lakes. Scores of millions of feet of hard woods in the forests to be traversed by these railroads, which are now worthless, will be turned to account as soon as such means of transportation will allow to carry them profitably to the furniture factories of Grand Rapids and the unlimited market of Chicago. By this route the pine and spruce of the Ottawa territory will travel only 125 miles by rail and less than 500 by water to reach the market of Chicago, which absorbs yearly about two billion feet of lumber, and also the market of Milwaukee, which takes an average of 250,000,000 feet. Actually, these markets are closed to the products of the upper Ottawa territory by the excessive length and cost of transportation. In one of his reports Mr. Henry O'Sullivan shows that several thousand square miles in the north-eastern section of the territory contains an abundance of good pine and spruce timber which can be made available only by the construction of railroads. The remoteness of part of these forests excludes their products even from the Ottawa market. 'In case,' he says, 'of a railway being built anywhere in the vicinity of Kakabonga or Bark lakes this whole region, covering one thousand square miles of territory, might be served with lines of steamers in connection with the railway. Although the first quality of pine has been culled here some years ago, there is still a great deal in the interior, and owing to the great distances and roughness of the rivers, the cost of driving is such as to forbid the handling of spruce or second quality stuff of any kind. With a railway and steamboat service it would be different; mills could be built on the spot and every kind of sawed lumber shipped by rail.

'In the last mentioned report, I dwelt on the great advantage that would accrue from the diverting of the Lake Victoria waters by the valley of the Dumoine, if it were possible to do so; but in the event that this may be found impossible, a more desirable and beneficial alternative would be the building of a railway through that country. A glance at the general map of that region will show that between the discharge of Lake Barrière and the discharge of Lake Des Quinze, there are over six thousand square miles of territory drained by the Ottawa and its tributaries above Lake Des Quinze, that can never be developed to any advantage without a railway. I am not prepared to say that all this great extent of six thousand square miles is fit for agriculture or well timbered; but I can safely say that more than half of this area is within the limits of the best pine-growing region now available in the province, and that a great deal of good agricultural land may be found there also.

No. 9.—Forest and soil destruction in Northern Ontario, in the region of the great Biscotasing fire. A large proportion of this area will never again produce a valuable stand, for the soil which was destroyed by the fire was an accumulation of ages.

'Of course if there were mills on the spot or if easy access could be had to this region, a great deal of good timber which is now left to rot could be utilized; but when we consider the awful distance, some seven hundred miles, that this timber has to be driven to the market, second quality stuff cannot pay.'

The Grand Trunk Pacific, probably, and the Quebec & Lake Huron Railway, for a certainty, will open this territory within three or four years, and more in the new Abitibi territory, thus imparting a high value and making practically available those six or seven thousand square miles of rich wood lands, and adding so much to our forest wealth and resources.

The same factors will in the same manner contribute to the rapid evolution in the value of our forest wealth in many other sections of the province.

QUANTITIES CUT FOR DOMESTIC USE AND EXPORT.

On this point, the census of 1901 supplies the following statistics:—

	Ft. B. M.	
Pine—		
Saw-logs	445,036,000	
Square timber	15,595,484	
		460,631,484
Spruce—		
Saw-logs	599,447,000	
Square timber	41,792,520	
		641,239,520
Hemlock—		
Saw-logs	.....	38,121,000
Cedar—		
Shingle blocks and squares	68,777,000	
Piles and poles	2,738,440	
Ties (2,703,807)	8,111,421	
		79,626,862
Hardwoods—		
Elm	3,465,860	
Ash	2,104,444	
Yellow and white birch	6,877,808	
Maple	963,276	
Oak	718,156	
Hickory	151,000	
		14,082,344
Pulpwood—		
Spruce, cords	474,178	284,506,800
Fir	52,687	31,609,200
	526,865	1,549,817,210

The several quantities are converted into feet B.M., for the purpose of facilitating comparisons.

HOW LONG WILL OUR FORESTS LAST ?

The most plausible manner to answer this question is to compare the contents of the forest with the yearly consumption, as shown by the census. And not to overstep the limits of sound reality, we will take only the reduced quantities given for that portion of our forests actually available and enjoying the advantage of accessibility to railroads and waterways. Dividing the quantity in stock or in forest, by the quantity of the yearly consumption, the quotient shows the number of years during which the supply will last. This result is shown in the following table:—

Stock.		Yearly Consumption.	Years.
Pine, feet	37,900,000,000	460,631,484	82
Spruce, feet	87,313,438,000	641,239,520	137
Cedar, shingles and square, feet	1,660,000,000	68,777,000	24
Cedar ties, No.	220,000,000	2,703,807	81
Cedar posts, No.	17,500,000	119,072	147
Hard woods, feet	356,000,000	14,082,334	25
Pulp wood, cords	176,783,966	526,865	334

The number of years shows the mathematical period of duration, without taking into consideration the various circumstances of a nature to shorten or to lengthen that period. Fire, indiscriminate settlement, unwise or unlawful cutting, waste in lumbering operations, the power of self-reproduction on the part of certain kinds of timber and the extension of railways through the forest, are in this respect factors of potent efficacy and deserving of the most serious consideration.

For those who have given special attention to this matter it is a well known fact that fire has destroyed many times more valuable timber than has the axe of the lumberman. This is especially the case with regard to pine. Before a committee of the Legislative Assembly, Hon. Mr. Edwards stated as his 'candid conviction that at least twenty times as much has been destroyed by fire as has been cut by the lumberman, having regard to the destruction of young timber that was growing at the time of the destruction.'

That statement refers to the pineries of the Ottawa territory, which contain practically all the pine we have in this province. If fire is allowed to continue its work of destruction, it would not be safe to extend the duration of pine beyond forty or fifty years.

Then there are the inroads under the pretext of settlement. As far as can be ascertained by the records in the Department of Crown Lands during the last sixty years the regular lumber business has removed from the forests of Pontiac and Wright about 18,000,000,000 feet of pine. If forest fires, caused chiefly by settlers in clearing lands, have destroyed not twenty times, but only as much, the total removed by lumbermen and destroyed by fire amounts to 36,000,000,000 feet, which would mean that under the present circumstances as regards forest fires and the same rate of production by the lumbermen the stock of pine now available in the upper Ottawa territory will be gone within fifty years hence. Forest protection has been better for the last few years, but the inroads of colonization are getting worse from year to year, so that there is not much hope of improvement as regards the preservation of the pineries. And the regular cutting by lumbermen will most probably increase as they have better means to ship their products to the ports on the great lakes and thence to Chicago, which demands more every year and pays higher prices as pine disappears from Michigan, Wisconsin and Minnesota.

All these circumstances considered, it may be said without exaggeration that fifty years is the longest time which may be assigned to the duration of our pineries. Of course, self reproduction of the forest might help prolonging that period, but there is not much to expect from this source. Pine only reproduces in some sections, under the most favourable circumstances, and it remains to determine whether, even under these favourable circumstances, it will keep on reproducing.

Cedar is in the same position as pine. It is not so much exposed to destruction by fire, but the indiscriminate and senseless cutting which has been going on for some years and increases all the time will soon make that timber a thing of the past, as is now the case in Maine, where the same practice prevailed for some ten or twenty years.

Hard woods in the sections where they are actually available will certainly last the period assigned to them, even under an increased production, and taking into consideration what new railroads will make accessible from year to year, the supply may be regarded as practically inexhaustible.

Our supply of spruce, for saw-logs and pulpwood, if protected against fire and prudently husbanded, is practically exhaustless. As a rule, this species reproduces by natural growth in fifteen or twenty years, if you cut only the big trees and leave the smaller ones—nine inches and under in diameter—to grow. The spruce forest is not, by the nature of the wood, so much exposed to fire as pine, and in case it is run over by fire, the timber can be cut profitably after the disaster, which is not generally the case with burnt pine. And by cutting only the larger trees, you stimulate the growth and development of the smaller ones, which then have more room and light, a circumstance which tends to stimulate the growth and improve the quality of the wood.

Unfortunately the desirable results which we might expect from this self reproduction of spruce are wiped out by our irrational system of colonization. By granting lands for colonization purposes indiscriminately and allowing settlers to take lots far away from settlements, we force the limit holders, the very men who have the greatest interest in its preservation, to destroy that forest in which they have invested large sums of money. In order to serve their best interests and secure permanency for their investments, lumbermen endeavour to prolong their trade by careful cutting and careful manipulation of the timber on their limits; but they are human just as other people and when they apprehend that they are to lose the fruit of their labour and wise husbandry, through the invasion of colonization, they quite naturally try to make the most out of the situation, they forcibly give up the system which they have followed for years in the management of their domain and cut everything out of which they can make money and realize as much as they can, for the purpose of recouping themselves for past disbursements. They act upon the principle that charity begins at home.

In this respect, however, the speculator or bogus settler is the chief factor in the destruction of the forest. As he practically pays nothing to secure the right to cut the timber, as he has not to maintain the value of an investment, as he is not, like the limit holder, bound to cut only the trees of the diameter prescribed by the regulations of the department, as, above all, his sole and only object is to make as much money as possible in as short a time as possible, he simply sweeps the forest, cutting and removing even twigs, if he can get money for them, and leaving not a tree of a size to bear seed for another growth. Moreover, the heaps and masses of branches, chips and other inflammable material which he leaves on the ground, invite fire, which generally answers the call and once started extends its work of destruction to the neighbouring green forests.

For one who has not verified the facts on the spot, who has not seen them with his own eyes, it is impossible to form an adequate idea of the damages caused by squatting or the location of settlers in the middle of the bush, more particularly in a pinery. I submit the following facts to those who are disposed to study the question in good faith and impartially:

Some years ago a man by the name of Antoine Lafond settled in the forest near Lake Cagamont, on the Eagle river, far away from other settlements. In clearing land for a crop of potatoes which yielded five bushels, he started a fire which destroyed *three hundred million feet of pine.* The pine so destroyed would be worth to-day $390,000 to the government in stumpage dues, $1,800,000 in wages for woodmen and at the low rate of $4 per M standing, $1,200,000 in profit for the holder of the limit. To put it briefly, to raise a crop of five bushels of potatoes, that settler destroyed tim-

ber which to-day would be worth at least $3,390,000. The country thus laid waste is now a worthless desert, where no settler would care to locate, so that this land is lost to all purposes.

In his evidence before the Colonization Commission, last year, Mr. J. G. Gillies swore that his firm has lost in the same manner one hundred million feet of pine in the Temiscamingue country, which represents a loss of $1,130,000 to the government, the woodmen and the limit holder. The late Mr. Alexander Lumsden mentioned two other similar cases where, in order to clear a few acres of bad lands in the Lake Kippawa region, fires were lighted that destroyed more than one hundred and twenty million feet of pine.

If this system is allowed to continue any longer, the prospect of our pineries is not bright.

Our spruce forests have suffered considerably from the same cause. In the north eastern part of the province, the trouble is with the Indians. For the purpose of signalling or creating blueberry plains to attract bears, or through negligence in camping, they start fires which destroy every year vast areas of forest. In regard to this, Dr. Low, in his valuable report on the Labrador peninsula, mentions facts deserving the consideration of all those who take any interest in the preservation of our forests.

HOW TO PRESERVE OUR FOREST WEALTH?

Many propositions have been submitted for the preservation of our forests, amongst which are cultivation and replantation. In the province of Quebec, these methods are neither desirable nor practicable. First of all, the government has not the means to carry on a system of sylviculture on such a footing as to produce appreciable results. In the second place, where reforestation would be perhaps the most needed, our public lands are in the hands of capitalists who have invested their money in forest as a business matter and who cannot reasonably be expected to adopt any new system of forest management, unless the ultimate returns are shown to be greater than those accruing from the ordinary methods of lumbering. As plainly stated by Professor Fernow, the only reason for lumbermen and most private owners to adopt forestry, is the financial one, and here, as it is the case in the United States, every plan of forest management must be in a measure a compromise between the owner of the forest and the scientific forester. It is also a matter of compromise between the government and the limit-holder. The object of the latter is to cut as much timber as possible without injuring the productive power of the forest, but he will most willingly leave a certain amount of capital invested in forest in the form of growing wood, obtaining his returns from the sale of merchantable timber after the necessary period of growth has passed, if he has the guarantee that his holdings will be fairly protected against dishonest encroachments under the pretext of colonization and against fire, which is the natural consequence of those encroachments.

Therefore, in the province of Quebec forestry as a practical matter is limited to protection against fire and the inroads of timber pirates raiding the forest under the pretense of promoting colonization. 'Rules,' says Professor Fernow, 'which are considered axiomatic abroad must often be set aside, and frequently results which could be obtained by the expenditure of a small amount of money must be satisfied because the owner of the forest cannot afford to make the investment. A sustained yield, an allotment of the forest into divisions, a permanent road system, the accessibility of all parts of the forest at one time, fire lines, improvement cuttings, and the like, which are usually considered a part of forest management in Europe—each must, in many instances, be given up as impracticable, for the present.'

Those sane and practical remarks apply to our province as they do to the state of New York, and should guide our action in matters of forestry. All our efforts should tend to the organization of a thoroughly effective system of protection against fire and the classification of our public domain into woodlands and farming lands,

with the view of securing free access to the latter by *bona fide* settlers and strictly excluding wood pirates, thus securing the limit-holders in the tenure of their holdings, thus encouraging them to adopt in their operations a system which would secure the perpetuity of the forest by self or natural reproduction. Let this system be adopted, and our forests, particularly our spruce and pulpwood forests, are practically inexhaustible, even under a production increased ten fold, compared to what it is now.

Our system of protection against fire has been materially improved of late, but is still inadequate and lacks that high degree of effectiveness which should characterize it. The law is good and would reach the end for which it was enacted if it was thoroughly observed, but when it comes to its strict enforcement, political influence interposes and the best interest of the province is removed to the back ground. In its report the Colonization Commission made the following recommendations which should be carried out:

'The staff charged with this service are too subject to political influences to perform their duties with the energy and independence which alone can secure its effectiveness. In several cases political influence has caused the post of fire ranger to be entrusted to men who have neither the activity nor the ability required to properly fill a position upon which depends the preservation of the greatest source of wealth of the province.

'All the license-holders have in their service permanently guardians of provision depots, overseers and foremen who possess a thorough knowledge of their respective territories, as well as of the neighbouring establishments. We know of no men who are better in position than these to perform the functions of fire ranger. We are of opinion that these men should be chosen and appointed in preference to all others and that no others should be named, except in the localities where there are none in the neighbourhood of timber limits under license. They also should be vested with all the powers conferred on justices of the peace by articles 1353 and 1358 of the revised statutes.

'Of course, the government should retain the control of this service and for this purpose have one or two special officers whose duty it would be to see that it was done actively and effectively. These officers would keep moving about all the time from 1st April to 15th November in the territories placed under their control and would be bound to recommend the dismissal of any fire ranger for neglect or incompetency.'

'Against the fire danger,' says Professor Fernow, 'constant patrol seems to be the only help, all other means seeming more expensive and less efficient.....Again the personnel of the organization is of first moment, and even when proper persons have been chosen, only a constant inspection and oversight will keep the organization alive, its members on the alert.'

The main object of a good organization should be rather to prevent than to stop conflagrations. When a fire is started it will very rapidly gain headway and run its course, all efforts notwithstanding, until a rain, a water course or swamp stops its spread. Therefore, the first duty of the fire rangers should be to control the setting of fire to clearings in the neighbourhood of green forest. During the dry season no settler should be allowed to burn a clearing without having previously notified the nearest fire ranger, who should be on the spot with the force of men required to control the fire and prevent its spread where it is set in a dangerous place.

With our democratic principles of government, it is perhaps a big undertaking to bring our people to appreciate the necessity of such a control and it is perhaps in preparing public opinion for this evolution that societies like the Canadian Forestry Association would contribute in the most efficacious way to the maintenance of the forest, at all events as regards the province of Quebec. Instead of wasting our efforts in growing a new crop of wood, let us limit them within the rather heavy task of keeping what is already grown and available.

In this respect, it may be said that the government is not doing enough, comparatively, for the protection of our forests. Our public buildings are worth less than $3,000,000. To protect them against fire we paid, in 1903, for insurance premiums

and salaries to guardians, about $50,000. In 1903, fish and game yielded a revenue of $63,119. For the protection of this source of revenue, we employed a staff of 315 fish and game rangers, to whom we paid $20,000 in salaries. For the same year, 1903, the receipts from woods and forests brought to the provincial treasury $1,241,814. For the protection of this, our largest source of revenue, we employed a staff of 99 fire rangers to whom we paid $17,000 for salaries and expenses, to which the limit-holders contributed their fair share.

Now, when we spend $50,000 to protect public buildings worth $3,000,000, when we spend $20,000 to protect a source of revenue which yields $63,119 and which can be very easily and promptly renovated if temporarily destroyed, are we justified in spending only the meagre and inadequate bagatelle of $17,000 to protect against irretrievable destruction a forest estate constituting the best, the most valuable and available asset of the province, an asset worth billions of dollars, capable of bringing to the provincial treasury a yearly revenue of $2,000,000 and procuring to our farmers and woodmen over $10,000,000 a year in wages and the sale of farm products?

The classification of public lands, such as authorized by a law passed by our legislature last year, will do much to lessen the danger from fire, if it is faithfully and energetically enforced. Colonization will be concentrated and it will be much easier to protect the green forests against the fire started for clearing purposes. With a good staff of active and intelligent fire rangers at hand, the danger will be minimized, and it is reasonable to hope that this legislation will produce the most desirable results, if political influence does not interpose to block the accomplishment of this important reform. This law, if fairly but rigidly enforced, will also hit the death blow on the nefarious brood of speculators on lots and timber pirates that constitute one of the greatest dangers for the forests.

Fires started by Indians are the most difficult part of the problem. Indians are under exclusive control of the Dominion government, who should be induced to take the steps required to prevent them from causing in the forests of the north-eastern section of the province damages which already amount to millions of dollars. In case the federal authorities would fail to accomplish this, the provincial government will perhaps come to the determination of applying to Indians that disposition of our law which forbids any one to go into the forest without a permit, during the dry season. And if this disposition is not in our statutes, it should be enacted. As regards action on the part of the Dominion government, the collaboration of the Canadian Forestry Association would be a great help, and I hope we will have the benefit of this collaboration.

The CHAIRMAN.—I really cannot allow such a paper as this to go by without saying a few words in commendation of the great care and attention which Mr. Langelier must have devoted to the preparation of it. I think it is one of the most exhaustive papers, and one of the most interesting papers, and one of the best papers in every respect that has ever been read before the association.

Any man hearing a paper of that nature read, or reading it from a report, must be seized with all the information necessary to enable him to realize what a great wealth the province of Quebec has in its forests, and how it can best be conserved, and why it ought to be protected. I do not think it is possible that anybody could have written a better paper upon such a subject than the paper we have just had the pleasure of listening to.

Mr. LITTLE.—I would like to show why we have such difficulty in protecting our forests. Our forests are more liable to loss by fire than any other forests in the world. As the subject is one of the greatest importance I have taken the trouble to prepare a short paper, which with your kind permission I will read.

FOREST FIRES AND MAKING SQUARE TIMBER IN THE WOODS.

BY WILLIAM LITTLE.

Honorary President of the Canadian Forestry Association.

As the subject of forest fires is of extreme importance to Canada, I crave your indulgence for giving some reflections of my own with reference to the serious losses sustained in some of the older provinces of the Dominion with which I have had personal experience.

This is a topic about which so much has been said and written of a character to leave the false impression that the great aim of nature was to destroy the forests by fire as rapidly as possible, and that all efforts of man were futile in prolonging their existence—a plea made by Crown Lands Commissioners as an excuse for their imprudent disposal of timber limits at the merest trifle of their value, and also by careless lumbermen for conducting their operations in a wasteful and reckless manner. And with the government at the same time actually deluding ignorant people to settle on the Laurentian rocks, covered only with a few inches of leaf mould, which as soon as exposed to the sun's rays by the removal of the timber is dried up and blown away by the winds and from which they can at best eke out a miserable existence for a very few years, while constantly exposing the surrounding timber to the risk of fire—it is hardly to be wondered at that millions of acres of valuable timber have been needlessly sacrificed.

My own experience has taught me that in the great majority of cases the fires came after the lumberman, not before him, and that with proper precaution and ordinary care fully grown pine forests even should not be considered a hazardous risk. They are not so considered in Germany or France or other European countries where proper precaution is taken for their protection. In France pine forests have been insured against loss by fire at as low a rate as one franc per thousand francs on trees fifty years old and upwards, or say one-tenth of one per cent per annum for mature timber.

In Sweden and Norway, where the forests are nearly all coniferous, the fire loss is comparatively trifling. Indeed I am advised that it is only to Americans and Turks that belongs the invidious distinction of being the great destroyers of the forest.

In corroboration of this immunity from loss by fire when the forests are properly administered permit me to give some replies sent in answer to inquiries made by General C. C. Andrews, chief fire warden of the state of Minnesota, in 1902, respecting losses by fire in European countries.

From France the report was:—"In the temperate and cold regions of France (that is in the larger portion of the territory,) the fires are but few and cause slight damage." Norway with a state forest area of 2,587,000 acres, and private forests of 18,000,000 acres reports: "The damage caused by fires is inconsiderable in the public forests. Many years there is none, and the damage done to private forests is of small account and not reported." Sweden with 18,000,000 acres of forests reports: "Only 1,200 acres damaged and loss about $10,000." Prussia having over 6,000,000 acres of state forests from which it derives a net revenue of $8,500,000 reports: "About 3,600 acres damaged in the four years from 1892 to 1896." Austria receiving a net revenue of $693,000 from 2,573,000 acres of state forests reports: "An average loss of $32,000." Bavaria with 2,150,000 acres from which it derives a net income of $3,227,000 reports: "The damage caused by forest fires is quite insignificant, being in 1890 only $964, and in 1894 only $1,686." The Duchy of Baden with 240,000 acres and a net revenue of $667,000 reports: "For the nine years 1879-1888 the damaged surface was 99 acres, and the damages, $2,225." Wurtemburg with 400,000 acres and a net revenue of $1,774,000 reports: "A fire loss of $640." And Saxony with 432,000 acres of forests and a net revenue of $1,946,000 reports: "The average loss is $300 a year."

All of which goes to show that when any ordinary care is given to the preservation of the forests the loss by fire is when compared with their extent and value a mere trifle, and while an investigation would, I have no doubt, prove that more valuable timber is annually destroyed by fire in the province of Quebec than in the whole of Europe in a quarter of a century that this great loss is chiefly due to the lack of a proper system of forest administration.

I never knew an instance where a forest fire or a fire of any kind burnt any longer than fuel was supplied to it in a proper condition for burning. This is the whole gist of the matter.

So that where our forests have suffered most severely from fire it would be found to be almost wholly due to the abominable manner in which lumbering operations were carried on in the past, and that nearly all recent grand conflagrations were due to the inflammable matter left by lumbermen in their operations, and that they and fraudulent or deluded settlers and not the elements are primarily responsible for the greater part of the losses caused by fires in the white pine forests of America,

It was so in the great Miramichi fire in New Brunswick in 1825, and about Moosehead lake in Maine the same year: it was the same in the great Poshtigo fire of 1871 in Wisconsin, and the great fires of 1871 and 1881 in Michigan; and also what is called the Hinckley fire in 1894 in Minnesota. All these fires were in districts where extensive lumbering operations had been carried on for years—where the forests were left filled with the dried tops, branches and other debris resulting from such operations.

And to show that I have good reason for attributing the great fire losses to imprudent lumbering I will endeavour to give some exposition, imperfect though it may be, of the manner in which the making of square timber was carried on in the provinces of Ontario and Quebec during the greater part of the past century, which makes it apparent that it would be difficult to devise a process better adapted for insuring the burning up of the pine forests of the country than that employed in the making of square timber in the woods.

The character of the timber required for this trade I give in the words of the late Hon. James Skead, of Ottawa, for many years one of the most extensive operators in this timber trade, as described by him just forty fears ago (1865), together with the yearly averages of the different kinds of timber cut for market at that time, when he said:—

"The square timber must be selected with great care, nearly perfectly straight, and entirely free from knots, shakes or other blemishes. It must be hewed perfectly square and must carry the same thickness throughout, a very slight taper indeed being allowable."

About one twenty-fifth of the standing pine is fit for square timber. It must be totally free from blemishes of any kind over thirty feet of its length, and should square at least fifteen inches.

The average yearly quantity of square timber then arriving at Quebec was, of square white pine 17,655,000 cubic feet, red pine 2,566,000, oak 1,585,000, tamarack 987,000, ash 142,000, and birch 92,090; making a total amount of square timber of 24,486,000 cubic feet, together with 250,000,000 feet board measure of sawed planks (deals), 250,000,000 board measure for home consumption, and 250,000,000 feet for the American market. The whole making 86,986,000 cubic feet, or over one million and three-quarter tons.

At that time it would appear that the square white and red pine amounted to about the same quantity when turned into feet board measure as was used for home consumption, or shipped in the shape of deals to Great Britain, or lumber to the United States; but in reality the drain on the forests for square timber more than equalled in value all that taken off in saw-logs for the manufacture of lumber and deals, for the same tree that would make a stick of 100 cubic feet, or 1,200 feet board measure, would saw into deals fully double this amount, or 2,400 feet board measure, and fully 2,000 feet when sawn into inch lumber; and since it was only the selected trees that were taken and they were to be free from knots or other defects for at least

No. 10.—The effect of a soil fire which slowly but surely eat its way along the forest floor. The trees are all killed—though unscorched except at the roots—and the soil absolutely destroyed wherever it was shallow.

thirty feet from the butt, the value of such timber must have been fully double that used for making saw-logs. I may remark that by some strange illusion the public accepted as a fact the dictum that the loss in the making of square timber, as compared with cutting the tree into saw-logs, was only about one-third or one-fourth part of the timber, as it was considered that when sawing the stick into lumber the saw cut away one-fourth of the wood into sawdust, which was supposed to equalize the waste when squaring, but the great loss arose from squaring the stick to the size of the square of the top end or nearly so, so that when the stick was 50 feet or over in length this smaller square caused so much of the butt to be cut away as to make the contents not to equal one-half what the tree would have made if sawn into deals or lumber.

But great as this loss of the most valuable part of the trees was, it was a mere trifle as compared with the subsequent loss to the forests occasioned by its manufacture in the woods owing to the great mass of combustible material left behind to become the ready means of spreading fires.

In order to get the timber from the woods the first thing to do was to make suitable roads on which to haul it to the landing places on the streams, and here you will see began the work of preparation for forest devastation.

The foreman, or boss as he is called, after having decided on the routes of his main roads into the body of the timber, sets his men to work to clear away everything, large or small, and pile it just outside of the line of his roads which had to be made sufficiently wide and straight to enable the longest sticks to pass without obstruction, and when completed you will find two continuous brush heaps piled one on each side of these roads that in a few months' time, exposed to the sun and winds, become com pletely dry and ready to ignite at any moment, and to carry the fire into the very heart of the forest. Timber roads were then made branching out from these main roads in all directions through the woods to reach the trees suitable for square timber. The chopper after having selected the choicest tree would assure himself that it was sound before cutting it down, which he did by striking the tree sharply on all sides with his axe, just as your doctor does by tapping with his fingers on your chest and back to ascertain if all is right within. When satisfied that the tree is sound he examines it carefully on all sides from bottom to top, noting which way it leans, and the size and position of its largest limbs, in order to decide how to cut it so as to make it fall where least liable to be broken or injured in falling, and where it would be most easily squared and removed, all of this requiring both experience and judgment, and should the ground be uneven he cuts down a number of small trees to make what is called a bed for the large trees to fall on and escape injury in falling, and in this way many growing young trees are sacrificed which would be in a few years fit for saw-logs.

After the tree is down the chopper examines the butt for shakes or rot in the heart, which is often found in very old trees, and if so to decide how much must be cut off the butt to make the stick free from rot or shake, otherwise it would be rejected as a cull, and often the most valuable part of the tree for clear lumber would be chopped off and left to rot in the woods. And lest it should be supposed this heart rot had the effect of injuring the surrounding wood, it may be said that while the heart of the tree may be several centuries old and have rotted away so as to leave the tree hollow butted, the remaining wood may be quite sound throughout, and more clear lumber might be got from such a log when sawn parallel with the outside than if it were sound throughout and sawn in the ordinary way.

If the tree has fallen in a suitable position for being hewn, work begins without severing the top from the trunk, otherwise the top is cut off usually just where the clear bole of the tree reaches the lower limbs of the crown, then after canting the trunk over till placed in a satisfactory position to be scored and hewn, the chopper chips off, or rosses as it is called, a few inches of the bark on each side of the top of the stick to enable the liner to chalk-line it to the size it will square, and to show the scorer how deep he may cut notches into the sides of the stick, without cutting into

and injuring the new surface of the stick when squared. These notches are usually cut about thirty inches apart along each side of the stick, and are sometimes as much as a foot in depth near the butts of large trees, while owing to the ease with which clear pine is split the wood between these notches, called score blocks, is often blocked off by an expert chopper with a single stroke of the axe. After the removal of these score blocks the scorer chops and chips off all surplus wood remaining, as close as possible, without cutting quite down to the line of the proposed squared surface. Then the hewer follows with his broadaxe and hews off all wood left by the scorer down to the line, and obliterates all traces of the scores made by the scorer's axe. After both sides are hewn square, the stick is then canted over on to one of its flatted sides, and the other two sides are lined, scored and hewn, and the stick is then ready to be skidded and hauled to the landing.

I may remark that so skilful do some of these men become from constant use of the broadaxe, that I have seen one, when hewing a large mast stick that was over six feet in diameter at the butt, to hew a clean surface of over four feet in depth so smooth and perfect that it looked as if it had been carefully planed, and where one could with difficulty discern where a stroke of the axe had been made upon it.

Now, let us compare the condition of the forest before and after the timberman had completed his work and removed the timber, and assuming that it was a grove of mature pine say from 200 to 300 years old, you would have found before the advent of the timberman, that the ground was strewn with many layers of pine needles, only the top layers of which were at all dry, the bottom layers being moist near the ground owing to the crowns of the trees making a close canopy and shading the forest floor from the rays of the sun. Underneath this close canopy you would find little, if any, underbrush, and not enough loose wood lying about to make a fire hot enough to cook your dinner, so that even if a fire were started and overran the ground it would find only a few surface leaves dry enough to burn, and could do but little damage to the timber; nor was there much danger of its spreading since there were no roads opened up through the woods for the winds to enter and scatter about the burning leaves.

If you would go there the following summer, after the removal of the timber, you would find the forest canopy broken through almost everywhere, and the sun's rays penetrating the forest floor of pine needles till they became as dry as tinder, so that the first sparks reaching them would start a fire that might set the whole forest ablaze. You would find in place of the old pine tree that under natural conditions had withstood the risk of fire and tempest for several centuries, and under like conditions would do so till it died of old age, there was now left only a worthless stump, about which were a lot of dry pine chips scattered broadcast in all directions over the forest floor of dry pine needles, and these pine chips increasing in size and quantity close to and around the stumps. Then from the stump is seen strewed along the ground for thirty feet and upwards, according to the length of the stick of timber removed, four rows of score blocks lying on the bed of dry pine needles, partially covered with dry pine chips, with more pine chips scattered about for a distance of from twenty to thirty feet along both sides of these four rows of score blocks which were cast off the stick by the scorer's axe; while on top of chips and score blocks lie strewed along from the stump to the tree crown the hewings and shavings made by the hewer with his broadaxe. Here you would find the massive crown upheld from the ground by the strength of its lower limbs, with many of its limbs and branches broken off and thrown about, littering the ground in all directions; and altogether limbs, branches and leaves drying and dying in the rays of the summer sun; while out of its dying stem is seen the turpentine gum exuding and dripping to the earth to catch the flame of any passing fire.

And when it is known that dry white pine is one of the most easily ignited of all our forest woods, and the most inflammable parts of this wood are the tops, limbs, branches and leaves, all of which are left behind to furnish fuel as it were to aid in burning up the rest of the forest, and all permeated with turpentine gum, and these together with the dried pine blocks, chips and shavings lie scattered about, covering

the forest floor of dry pine needles, and all exposed to sun and wind, and ready for any chance spark to set them on fire and burn up the surrounding timber. And when it is also known that there was added regularly year after year for the greater part of a century an average of over two hundred thousand of these fire-spreading timber zones throughout the forests in all pine timber sections of the country, the debris left by each stick covering an area of ground of probably five thousand square feet in extent, would it not look as if it would require almost the constant intervention of Providence to save the pine forests of the country from destruction by fire.

I know that it may be said that there are sections of the country where fires have been very destructive to the forests, and yet no square timber had been made therein, but I know of few sections where the lumberman had not been in advance of the fire; and the manner in which saw-logs were got out, say fifty years ago, when hardly any value was placed upon the timber, was but slightly less destructive to the forests than in making square timber. At that time only first quality deals, which were called merchantable, were regularly purchased; and although buyer and seller might agree on a certain proportion of seconds, all qualities below these grades were culls. Then only what were called deal logs, or logs that would saw out largely clear lumber, would be taken from the woods—the slightest defect culled the log—with the result that the whole lumbering country was overrun by jobbers to get deal logs for the insatiable saw-mill; trees were cut down, every one of which, and every part of which, would now be taken with avidity, were on account of some trifling defect left to rot in the woods; net works of roads were made everywhere through the woods to be grown up afterwards with underbrush—one of the chief means of spreading the fire—and no thought whatever was then given by any one to check the spread of fire when started, unless in the vicinity of fences or buildings.

Even to-day those intrusted with the administration of our affairs scarce give a thought to the seriousness of the situation, and even boast of our forest wealth, when the invaluable white pine, our most important forest resource, is about gone; and our lumber merchants in the city of Montreal, at the mouth of the great Ottawa river, that only a few years ago we were told contained inexhaustible supplies of the finest white pine, are now forced to send to the southern states and the Pacific as the cheapest places from which to supply their customers with suitable timber for building purposes.

And instead of exporting from Quebec 23,147,500 cubic feet of white pine, as was done in 1863, when I was engaged in this trade, the total export last year was only 1,491,843 cubic feet or little over six per cent, while the prices which then ranged from 6 to 16 cents per cubic feet have now more than quadrupled, and range from 35 to 65 cents per foot for smaller and inferior timber.

And to know that there are good reasons for believing that a large amount of pine that has been needlessly sacrificed to the flames might have been saved, one has only to read the recent Crown Lands and Forestry reports of Ontario, where it is shown that since the province inaugurated a fire-ranging system very few serious fires have occurred, and doubtless many million dollars' worth of timber have been saved to the country. Its efficiency being highly appreciated by all Ontario limit holders, who also contribute to its cost, and in commendation thereof I heard Mr. J. R. Booth state at one of our forestry meetings that, 'one forest fire occurs now where there were ten a few years ago,' and he attributed this satisfactory result to the excellent system of fire-ranging in operation now in the province of Ontario.

From the report of the Crown Lands department of Quebec for the fiscal year 1901-2 I find that out of receipts paid into the treasury by limit holders of over one million dollars ($1,055,037), there was expended for the supervision and protection of the provincial forests from fire on an area of 116,500 square miles, equal to 72,500,000 acres (the area of leased limits alone amounting to 62,952 square miles, equal to 40,000,000 acres), the petty sum of $7,226 !

This makes the annual cost of fire protection about $100 for each million acres, or less than 6½ cents per square mile, while at the same time the government is receiv-

ing from the limit holders, besides the bonuses paid and timber dues, an annual rental of $3 per square mile, which amounts on this account alone to the sum of $1,763,983.

During the same year (1902) the province of Ontario with only 18,191 square miles of territory under license, being less than one-third that of Quebec, expended for fire-ranging services nearly five times as much, or $34,200, and saved thereby millions of dollars' worth of timber from being destroyed by fire—this being a situation wherein an ounce of prevention is worth many pounds of cure, and where it would cost less to save one thousand dollars' worth of matured timber than to grow ten dollars' worth of young trees.

But common sense would indicate that in our eastern provinces of Canada so especially adapted for the successful growth of timber, and where it will in a few years command higher prices than in many parts of Europe, owing to the enormous demands that must be made upon us, not only by the northern states of the American Union, but by our own great central treeless territories, it would be prudent to expend in the salvation and growth of timber not only to the extent of thousands of dollars, as is done in Quebec, or tens of thousands as in Ontario, or hundreds of thousands as in some of the minor European countries, but even millions of dollars as in France and Germany, where they not only get returns of from two to five dollars for every one expended, but have their stocks of timber increased and made more valuable each succeeding year; whereas we possessing without outlay on our part some of the most valuable forest lands on the earth's surface, have been treating them in the same improvident manner as the prodigal spendthrift who keeps selling off portions of his patrimony every few years to meet his extravagances till all is gone.

RESOLUTIONS.

The following resolutions were submitted by the Committee on Resolutions and adopted:—

1. *Resolved,* that this association has learned with great pleasure through a telegram from Senator Edwards that the Right Honourable the Premier of Canada has expressed his desire that a Forestry Convention should be held during the coming summer or autumn in Ottawa, and that the Dominion Government will render suitable aid to such a convention.

The Association desires to express its great gratification at the interest in its work indicated by this action on the part of the Premier of the Dominion and to express its hearty concurrence in the suggestion for holding such a Forestry Convention, and the Executive Committee of this Association is hereby authorized to confer with the Right Honourable the Premier and to take such steps as may be necessary to carry out the proposed convention; and that a copy of this resolution be sent to Hon. Mr. Edwards for presentation to the Premier.

2. *Resolved,* that in view of the proposed construction of a new transcontinental railway and the projection of other lines passing largely through coniferous forests, the attention of the governments of the Dominion, and the provinces and also of the railway companies, be called to the serious danger of loss of valuable timber consequent upon the construction and operation of such lines, if all possible precautions to prevent the starting of fires are not taken, and to urge that the question be given full and careful consideration, that to the end sought the party or parties contracting to build the different sections of the said roads be required to enter into an agreement for an efficient equipment and control to prevent fires, that at such seasons as may be necessary an effective patrol be established along the afforested line of railway, and that the officers both of the governments and the railways be required to use all possible diligence to prevent the starting or spread of fires through defective equipment or through the carelessness of the operations or negligence of the employees under their control.

3. *Resolved,* that in view of the difficulty in dealing with cases of fires started for the clearing of land and for other purposes, the Canadian Forestry Association beg to respectfully submit to the government of the province of British Columbia that the Bush Fires Act of that province should be amended so as to prohibit the starting of fires except for cooking or other domestic purposes between the first day of May and the first day of November in each year, unless a special permit for the purpose be granted by the forest ranger or other officer appointed for the district in which such permission is asked.

And that permits for the clearing of land by fire shall only be issued after inspection of the locality by said forest ranger or other officer, and that any forest fire ranger appointed by either the Dominion government or the government of the said province shall have the authority of a constable in dealing with all offences under the said Bush Fires Act.

4. *Resolved,* that in view of the difficulty in dealing with cases of fires started for the clearing of land and for other purposes, the Canadian Forestry Association beg to respectfully submit to the government of the province of New Brunswick that the New Brunswick Fire Act of 1885 should be amended so as to prohibit the starting of fires except for cooking or other domestic purposes between the first day of May and the first day of December in each year, unless a special permit for the purpose be granted by the forest ranger or other officer appointed for the district in which such permission is asked.

And that permits for the clearing of land by fire shall only be issued after inspection of the locality by said forest ranger or other officer; and that any forest fire ranger appointed by the government of the said province shall have the authority of a constable in dealing with all offences under the said Act.

5. It having been represented to the Canadian Forestry Association that a large part of the right of way of the Intercolonial Railway running through the province of New Brunswick is not cleared of young growth and other combustible material, as provided by section 11 of the New Brunswick Fire Act, passed in the year 1885, which section provides: 'Whenever a railway passes through woods, the railway company or owner, &c., shall clear from off the sides of the roadway, from the lands taken for such railway, or up to the edge of the forest on such lands taken by the said company for said railway, all brushwood, logs, and like combustible material, by burning the same at a safe time, or otherwise removing the same.'

It is therefore resolved that the attention of the Minister of Railways be called to the above matter, and the Association respectfully asks that steps be taken as soon as possible to clear the right of way of this combustible material.

Resolutions of thanks were passed to those who had so kindly entertained the Forestry Association in the city of Quebec, to the railway companies for privileges granted, to the press for numerous courtesies, to the governments who had so kindly made grants in support of the work, and to those who had prepared papers for the meeting.

COL. LOGGIE.—I would like to say that there is something that I forgot to tell you yesterday when I was reading my paper, and that is that the province of New Brunswick has passed legislation to form a provincial park, or forest reserve. This park contains nine hundred square miles of territory. The Act provided that it be proclaimed by Order in Council, and the government chose a particular park, but they have never been able to lay it off yet. Perhaps it would be well for this association to draw the attention of the Premier to the fact that it would be well to deal with this matter. We could comprise it in a resolution, and I do not think it would be very much out of place now, seeing that we are dealing with forest reserves.

The CHAIRMAN.—Don't you think, Col. Loggie, that where the government has passed an Act declaring its intention to do something, which can be done by Order in Council, that it would be scarcely the thing for us to force immediate action upon them? I have no objection to a resolution being passed as you suggest, but it just occurs to me that if they have passed an Act which gives them authority to do certain things, that they will do them in their own good time. There may be some difficulty in selecting the area, of which we have no knowledge.

I am not anxious that this association should assume any more than the government of the province.

COL. LOGGIE.—The Act was passed two years ago, and all that time has elapsed. The thing has probably gone out of their minds altogether.

The CHAIRMAN.—Do you think that this will bring it to their minds?

DR. CLARK.—I do not think it would be advisable for the association to pretend to advise the government in a matter of this kind, unless the facts were fully laid before us.

Mr. CHOWN.—Several gentlemen have suggested to me that no matter of greater importance has come before this meeting than the one to which I referred a few moments ago. In order that it may be brought properly before the meeting, I have drafted a resolution, which I think will not meet with any very serious opposition.

I therefore beg to move the following resolution, which is seconded by Mr. Craig:—

'That in view of the very serious results in different states through heavy taxation on forest acreage, the Canadian Forestry Association respectfully urge upon the different provinces that revenue from forest lands be so far as possible raised by stumpage dues rather than rentals.'

I do not know whether you will allow us to discuss this matter now, Mr. Chairman, but a great many of us feel that a resolution of this kind would, in the present state of the forest, in the Dominion, perhaps be as valuable and as large a step as we can take.

I have not made the resolution in any way personal to British Columbia, or to any of the other provinces. It is simply an expression of the opinion of the Canadian Forestry Association that the provinces should raise their revenues from stumpage dues, and from the sale of the rights, rather than have high rental, which led to the complete clearing of the land, as has been said before.

The CHAIRMAN.—Before that resolution is put to the meeting I want to say that I think it is scarcely fair to propose a resolution at this time that is so far reaching in its effects as this, and which requires so much thought and discussion, and which brings this association into antagonism with the well considered policy of the different provinces. Personally, I do not think that we ought to do anything of the kind. If the question is going to be taken up, I will have to ask somebody to take the chair, and I will proceed to discuss it.

I do not think that we ought to take up a resolution so broad as this one at this hour of the day (one o'clock), a resolution which is so controversial in its character, and of which we have had no notice.

Mr. CHOWN.—I do not want to appear discourteous, but it has been suggested that perhaps the association might accept it as a notice of motion for the next annual meeting of the association.

The CHAIRMAN.—There is no necessity of giving a notice of motion.

Mr. CHOWN.—Well, will you allow me to make it as a notice of motion, so that it may be printed in the minutes, and come up for discussion next year?

The CHAIRMAN.—I would like to hear from the gentlemen from British Columbia on this question. It affects them more than anybody else. The resolution is not exactly correct as it now stands. There is no taxation on timber limits in Ontario.

Mr. CHOWN.—I said 'in other states,' and I had the State of Michigan in my mind.

The CHAIRMAN.—There is no provincial taxation in British Columbia.

Mr. JONES.—There is under certain circumstances. It depends upon whether they are according to grant or license. The license gives you only the right to cut, and is not taxable. But a great deal of the timber there is cut in such a way that you have to buy the land, and that renders you liable to taxation.

The CHAIRMAN.—That is private property.

Mr. JONES.—Yes, but it is timber land.

Col. LOGGIE.—I think it would be advisable for us to postpone the discussion of this matter until next year. It is a very important subject, and we have not the time to deal with it as it should be dealt with. A great part of the revenues of the provinces are raised in this way. As my information now stands I would have to vote against the motion as it reads at present. I think, perhaps, it would be better to postpone it till next year, and we will have time to consider it.

Mr. RECORDER WEIR.—Perhaps it would be better for us to deal with it as Mr. Chown asks. He simply asks, as I understand it, that it be placed upon the minutes, and then it will be discussed and adopted or defeated at the next annual meeting. During the interval we will have it before us in order that we may study it, and when the time comes we will be prepared to discuss it in a full and proper manner.

The CHAIRMAN.—So far as I am personally concerned I would rather that it did not go upon the minutes as a notice of motion. Why cannot we deal with it the same as any other resolution?

Mr. BOSTOCK.—Perhaps the mover and seconder, seeing the view that is being taken of the matter, would withdraw the motion before getting an expression of opinion from the association.

I think the position taken by our chairman is a very wise one, and that the association should confine itself as far as possible to principles, leaving the details to those who are concerned.

If we keep to those lines we are pretty safe, and the influence of the association will be increased rather than diminished. If we persist in this we might get ourselves into bad odor with some of the provincial governments.

I would suggest to the mover that if he were to withdraw his motion after having it specially before the meeting his purpose would be attained.

Mr. STEWART.—I think the object of the mover has been attained, so far as having it before the meeting is concerned. This discussion will appear in the minutes.

Mr. CHOWN.—Although we should not be too fearful, I am fully aware of the fact that some people rush in where others are wise.

I do not see that it can do any harm to take this as a notice of motion. It does not commit the association to anything till it is adopted. If it should be refused then we shall have had the opinion of the Forestry Association on the subject.

I am not so formidable a person that anybody will be influenced by the fact that I gave a notice of motion of what I considered to be the proper thing for us to do.

Mr. PRICE.—I heartily endorse the action of our president in asking that this motion be not put before the association now, because I am of the opinion that at the next meeting when it comes up, that it will be time enough for us to deal with it then.

I think it is undesirable to bring in any element that might produce a conflict of opinion during the year.

The matter cannot be settled at this meeting, and I do not see the use of it appearing that we dealt with it at all, unless we are in a position to discuss it properly and intelligently.

Another thing, I do not generally believe in notices of motions. I think that they are an undesirable thing for several reasons.

I therefore hope that the mover will not persist with his motion at this time.

Dr. SCHENCK.—Not being a Canadian, I am perhaps not entitled to an opinion in this discussion. In addition, I must confess to be insufficiently acquainted with the detail of the system of ground rents, of which I have merely a reading knowledge.

It has been stated that the Canadian Forestry Association must deal with principles only. Now, if there is a principle underlying the idea of conservative forestry, it is certainly that of 'the conservative conduct of a remunerative business.'

As a business, forestry depends, like all other industries, largely upon the rate of annual taxation. The government can raise an industry by taxation or can kill it by taxation; encouraging it by low taxation, or destroying it by heavy taxation. As far as I can see, the ground rents rest on the timber limits in exactly the same man-

Photo. by J. F. Clark.

No. 11.—A pulp-wood slashing on which was cut over 50 cords per acre, showing how the real or supposed interest of a private owner often results in the total destruction of the forest. It only awaits the all but certain after-lumbering fire to make the land a desert indeed. [96

ner in which the taxes rest on the timber land in fee simple south of the international boundary line.

If a legislature wants to dig the grave of conservative forestry, it can do so by charging it with heavy taxation (or ground rent), or by refusing it protection from unjust assessment, emanating from a short-sighted political attitude.

In the lake states the forest has been killed, in many a case not by the lumberman, but by high taxation.

The United States have propagated their industries during the last 25 years, more or less artificially, by paternal taxation. I refer to the indirect taxation, consisting of high customs duties on importations competing with home production.

Undesirable industries—for instance, the liquor industry—may be restricted, on the other hand, by high taxation. Similarly, we can down conservative forestry for ever by imposing on the forest a rate of taxation (or ground rents, the result being the same) which the forestry business cannot endure.

It can be readily proven that the final gross revenue obtainable from conservative forestry is offset by the counter action of heavy annual fees (taxes or ground rents), accumulating at a compound rate of interest, like the premium in a life insurance.

It seems to me that the Canadian Forestry Association cannot avoid for any length of time to touch the sore spot of ground rents, one of the most vital interests of forestry being involved in the problem. Not knowing whether it is wise, from the political standpoint, to force the problem to the front to-day it might be as well to delay further discussion until our next meeting.

The CHAIRMAN.—I will be quite ready to discuss the question at the proper time, and in the proper place. This resolution is of so controversial a character that we could not possibly pass it without a very long discussion. If we are to dispose of this resolution now, the chances are that we will have to abandon the excursion which has been planned for us.

Mr. RECORDER WEIR.—It is not so serious as that, Mr. Chairman. Mr. Chown is prepared to accept your suggestion that the controversy involved in dealing with the resolution be postponed till next meeting. He simply gives notice of motion that the matter will be brought up then. It is clearly a matter of vital importance, and it is evident that there are two sides to it. It seems to me that Mr. Chown is simply exercising his constitutional rights in offering it as a notice of motion, to come up at the next annual meeting for discussion and disposal. If this is accepted we need not spend any more time over it.

The CHAIRMAN.—That is just what I thought. If there was any necessity for giving a notice of motion in order to have it before the next meeting, there would be absolutely no doubt of his right to make it as a notice of motion.

Mr. CHOWN.—Well, I would ask to be allowed to let the matter drop, and have the motion withdrawn.

Senator BOSTOCK.—There is just one thing that I would like to say before we adjourn, and that is would this association take into consideration the advisability of meeting in British Columbia next year? I think it would be a very great assistance to the forest interests of that section of the country, and if the association could see its way to coming out there I am sure that not only the people but the lumbering interests as well will tender them a very hearty welcome to the province.

We have big reserves out there, and some big trees, and it may be interesting for some of the members to see things as big, and bigger, than they have in this part of the world. I might also say that we have some big fish there.

Without detaining you longer, I would be very glad if the association could arrange to meet in British Columbia next year.

Mr. STEWART.—Until we know definitely what shape this Ottawa meeting is going to assume I think that perhaps it would be as well for us to leave the matter of the selection of a place for the next annual meeting open. Leave it in the hands of the executive. At the present time it is almost impossible to say where we should hold it. If we are to meet in Ottawa it might change our ideas and plans. I think under the circumstances that we had better leave the matter in the hands of the executive. I think we can trust them to do what is right.

The CHAIRMAN.—I would suggest that it would be a good idea that the question of the place of the next annual meeting of the association be left in the hands of the board of directors, and if they find that the proposed conference at Ottawa does not interfere with the annual meeting, that they endeavour to arrange it so that British Columbia be considered when they are making the selection of the place.

Senator BOSTOCK.—I would be very pleased to leave it in that way.

The meeting then adjourned till ten o'clock in the evening.

ELECTION OF OFFICERS.

The session being called to order at ten-fifteen p.m. by the president, Mr. Aubrey White, the election of officers was proceeded with, and resulted as follows:—

PATRON—His Excellency the Governor General.

HONORARY PRESIDENT—Aubrey White, Toronto, Ont.

PRESIDENT—E. G. Joly de Lotbinière, Quebec, Que.

VICE-PRESIDENT—E. Stewart, Ottawa, Ont.

SECRETARY-TREASURER—R. H. Campbell, Ottawa, Ont.

BOARD OF DIRECTORS.

J. R. Booth, Ottawa, Ont.; Hiram Robinson, Ottawa, Ont.; Monsignor Laflamme, Quebec, P.Q.; Wm. Saunders, LL.D., Ottawa, Ont.; Thos. Southworth, Toronto, Ont.; H. M. Price, Quebec, P.Q.; Dr. Robt. Bell, Ottawa Ont.

VICE-PRESIDENTS FOR THE PROVINCES.

At a subsequent meeting of the Board of Directors the following Provincial Vice-Presidents were appointed:—

Revd. A. E. Burke Alberton, P.E.I.; Hon. J. W. Longley, Halifax, N.S.; His Honour J. B. Snowball, Chatham, N.B.; Hon. S. N. Parent, Quebec, P.Q.; His Honour the Lieutenant Governor of Manitoba, Winnipeg, Man.; His Honour A. E. Forget, Regina, Assa.; Wm. Pearce, Calgary, Alta.; F. D. Wilson, Ft. Vermilion, Atha.; Hon. H. Bostock, Monte Creek, B.C.; Hon. J. H. Agnew, Winnipeg, Man.; Hon. Nelson Monteith, Toronto, Ont.

On Friday afternoon a pleasant trip to Montmorency falls was taken, through the kindness of the Quebec members, and was thoroughly enjoyed by all.

In the evening a session was held in Morrin College Hall. An interesting description of 'A Forest School,' illustrated by a number of views of students at work in the forest, was given by Mr. W. H. F. Addison, of the Yale Forest School. This was followed by an illustrated lecture on 'The Forest as a National Resource,' by Dr. Judson F. Clark, Forester, Ontario Bureau of Forestry.

On Thursday evening a banquet was tendered to the visitors by the Quebec members of the Forestry Association. The splendid character of the hospitality of the city of Quebec was shown on this occasion, and elicited the strongest expressions of appreciation on the part of the guests. Brilliant speeches were made in response to the various toasts, and special reference may be made to that of Monsignor Laflamme. Speaking in reply to the toast of the Educational Institutions, Monsignor Laflamme, referring to a paper on Forest Insects read during the afternoon, said that the writer had overlooked three very injurious bugs, namely, *Ignoratio communis, Indifferentia generalis* and *Influentia politica.* For the first two education and popular agitation are the remedies; for the last the Reverend Abbé had no specific to offer. He urged that steps should be taken for the establishment of a school of forestry in Quebec, or for the sending of students to France to take a special course at the forest school at Nancy.

THE FOREST AS A NATIONAL RESOURCE.

JUDSON F. CLARK, Ph. D.,

Forester of the Province of Ontario.

The resources of any nation are the natural resources of the country occupied, together with what population and capital it may have or may be able to attract. Population and capital may increase or decrease, may be imported or exported, but the natural resources are a limited quantity not capable of being increased, though through mismanagement they may be decreased and even destroyed.

Countries having great natural resources are certain, sooner or later, to become great and prosperous, for there is ever a surplus of capital and labour seeking opportunity for profitable employment in the development and utilization of natural resource wherever it may be found.

The natural resources of a country are its climate, its soil, its minerals and its fisheries. The climate and soil together furnish the conditions for its agriculture and its forests. The agriculture is chiefly concerned with problems of food and clothing, the forest with the problems of wood and water.

The forest may be regarded as a national resource as the source of supply of several raw materials which are altogether, or all but altogether, necessary for modern modes of living. Chief among these materials is wood. Second only to its importance as a producer of wood is the function of the forest in regulating the flow of the streams to prevent on the one hand such calamities as floods, erosion, and silting, and on the other to conserve the water for domestic use, irrigation, power, and navigation. The forest is also a national resource in its beneficent effect on climate; in providing an ideal playground for all the people; and as a field for the employment of capital and labour, in which respect it is second only to agriculture.

In a new country containing apparently inexhaustible forests abounding with streams having a sustained and regular flow, it is perfectly natural that the production of wood and the conservation of water should at first demand but a minor consideration, if indeed they be considered at all, while practically the whole attention and effort of the people and government will be directed to the development of the agriculture, mining, manufacturing and lumbering industries and to transportation problems.

In common with other heavily wooded countries, this has been the history of Canada. As the natural supplies of wood become more and more limited, and the effects of deforestation more and more evident in the irregularity of stream flow and in other ways, the problems of forest and water conservation demand ever increasing interest and attention, and we may hope that the place of the forest as a national resource of first magnitude will be finally fully appreciated. May that day come before irreparable injury is done to the forest lands of Canada!

The most obvious and perhaps the most important function served by a forest is that of supplying raw materials for the industries of a nation. Wood is of course the chief material produced, though bark for tanning, turpentine and allied products, and even sugar are all products of much importance.

Wood has ever played a most important part in the history of civilization. Indeed, civilization without wood is almost inconceivable. Dr. Fernow has well said that it surrounds us either as a convenience or a necessity from the cradle to the grave. We are rocked in wooden cradles, we play with wooden toys, we sit on wooden chairs and eat from wooden tables; we are instructed by reading wooden books, printed with ink made from wood, entertained by wooden musical instruments, and at last are laid away in a wooden box. In mining, manufacturing and transportation wood is used

No. 12.—In the virgin pinery. These trees average fully 200 years old. [100

at every turn. Every hundred tons of coal require two tons of wood to mine it. Every pound of iron, every ounce of gold or copper requires wood to mine it, wood to refine it, wood to transport it.

Not only do civilized countries use vast quantities of wood, but they are ever increasing their consumption. This is, I think, a fact not generally appreciated; indeed, when one recalls the large amount of substitution of wood by iron, steel and cement which has taken place during the last one or two decades, it is almost past belief that the consumption of wood should be still on the increase. Yet it is undoubtedly a fact. There is no civilized country in the world whose trade statistics are worth anything which does not indicate exactly this condition. Indeed there is little doubt but that the *per capita* consumption of wood of all civilized countries materially increased during the decade from 1890 to 1900, a decade characterized by greater substitution than any that preceded it, and by rapidly advancing prices of wood the world over, both of which must have had an opposite tendency.

Great Britain may be taken as a good test country for the purpose of discovering modern tendencies of wood consumption. Her statistics are compiled with great care, and volumes of materials as well as values are everywhere available. She imports practically all her wood, hence all kinds of wood are dear, and are naturally used with economy. She is one of the leading nations both in the production and consumption of iron, steel and cement. Surely here, if anywhere, the consumption of wood will show a falling off commensurate with the increasing price. The contrary is the case. The accompanying diagram (No. 1 on the right) shows the total imports less the exports of hewn, sawn and split woods for the fifteen years, 1886-1900. It will be seen

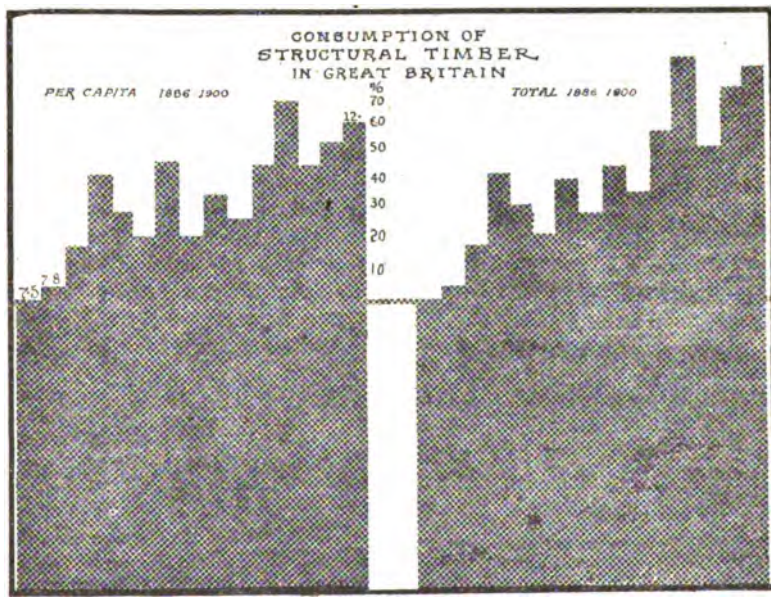


DIAGRAM NO. 1.—Showing on the right the imports less the exports of the United Kingdom, of hewn, sawn and split timbers for each year from 1886 to 1900. The same table is shown on the left reduced to a *per capita* basis.

that the increase in the consumption of wood during these fifteen years was about eighty per cent. On the left of the same diagram is the same table reduced to a *per capita* basis. It will be noted that notwithstanding the increased use of substitutes, and the advancing prices, the average man increased his consumption of wood about sixty per cent in the fifteen years. The *per capita* consumption of cabinet woods as shown in diagram No. 2 (on the right) increased even more rapidly, amounting to

over one hundred per cent during the period; but all other increases are eclipsed by that of the consumption of wood pulp (diagram No. 2 on the left), which increased from nine and one-half pounds *per capita* in 1886 to thirty-nine pounds in 1900, *an increase of over 300 per cent.*

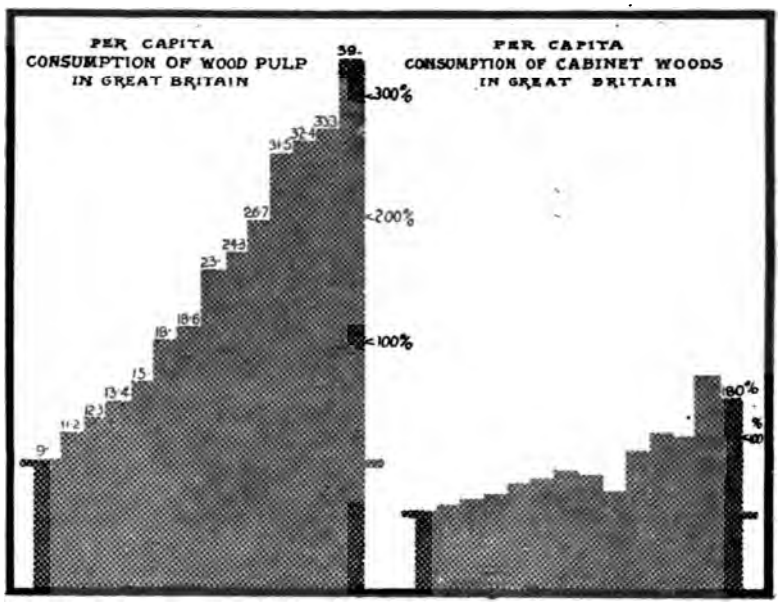


DIAGRAM No. 2.—Showing on the right the *per capita* consumption of cabinet woods in the United Kingdom for the years 1886–1900, and on the left the consumption of wood pulp during the same period.

The same tendency is shown by Germany and other European countries. The German Empire, with twenty-four per cent of the land under forest and practising the most intensive forest management in the world, has notwithstanding a greatly increased production of wood in recent years, failed utterly to keep pace with her increasing needs. Up to 1863 Germany was a wood-exporting country. By that year her growing home consumption had overtaken her production, and imports and exports equalled each other. Since then, keeping pace with the development of her modern industrial life, her needs for wood have steadily grown, and despite her increased production her imports exceeded her exports in value to the amount of $70,000,000 in 1900, and the unfavourable balance still grows.

Nearer home we find the same story, but with even greater emphasis. The United States *per capita* consumption of 160 feet board measure in 1850 has steadily grown from decade to decade, until in 1900 it reached 460 feet. The total consumption has grown at a much more rapid rate (see diagram No. 3), for the increase of population has been very great. In 1850 between three and four billion feet supplied the needs of the nation, and in 1900 it required more than thirty-five billion feet. The rapidly advancing prices of the last decade, aggregating fully one hundred per cent, have failed to materially check this tremendous consumption, for the latest statistics indicate a small but substantial increase in the *per capita* consumption. We have not sufficient data at hand to determine the present *per capita* consumption in Canada, but we may safely assume that the tendency is similar here to that of other civilized nations.

Not less noticeable than the increasing demand for timber by civilized countries is the diminishing of the supplies of such kinds and qualities as are most generally useful, and nowhere has the diminution of supplies more strongly contrasted with in-

creasing home consumption than in North America. Were it possible to limit the annual cut in North America to a volume equivalent to the annual growth, as now

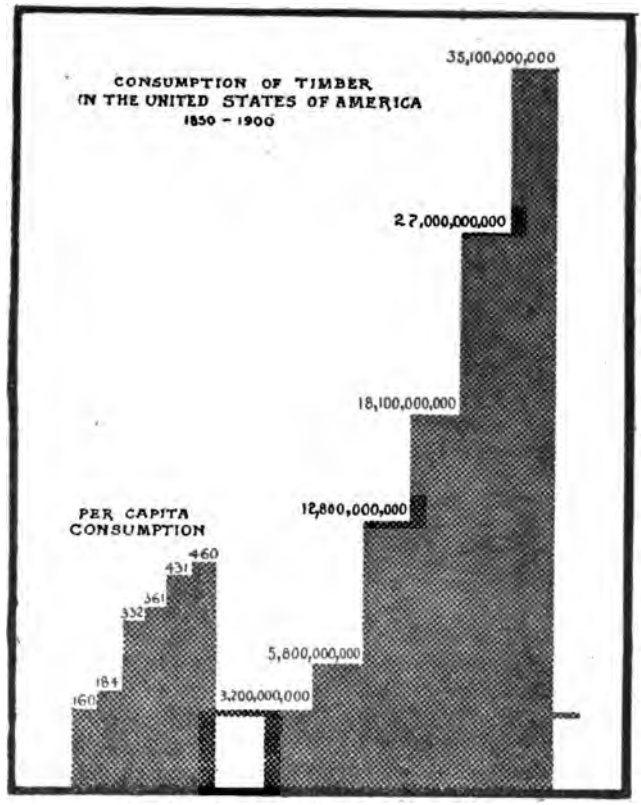


DIAGRAM No. 3.—Showing on the right the increase in the total consumption of wood in the United States by decades from 1850 to 1900. On the left *per capita* consumption is given for the same period.

obtains quite generally in Europe, there would be such a shortage of supplies that not only would exportation become impossible but prices would advance to previously unheard of figures. The gradual exhaustion of the remaining forests, together with their devastation by fire, will soon force this result, and the most of us will live to see the day when North America will import at great cost a poor substitute for the cargoes of the finest timber in the world which she has been sending to foreign lands at practically the cost of cutting and transportation.

The conservation of water for useful industrial purposes and for the prevention of calamities by flooding of the streams, is a function of the forest which is second only in importance to that of wood production. The keynote of worth in stream flow, whether for irrigation, power, navigation or domestic use, is *sustained flow*. Likewise the keynote of safety from floods, erosion or silting is *sustained flow*, and the forest is the great and almost only regulator of stream flow.

The rainfall of any country returns to the air and the ocean in four ways: by evaporation and transpiration, called the 'fly-off,' and by surface run-off and seepage run-off, which together form the stream flow.

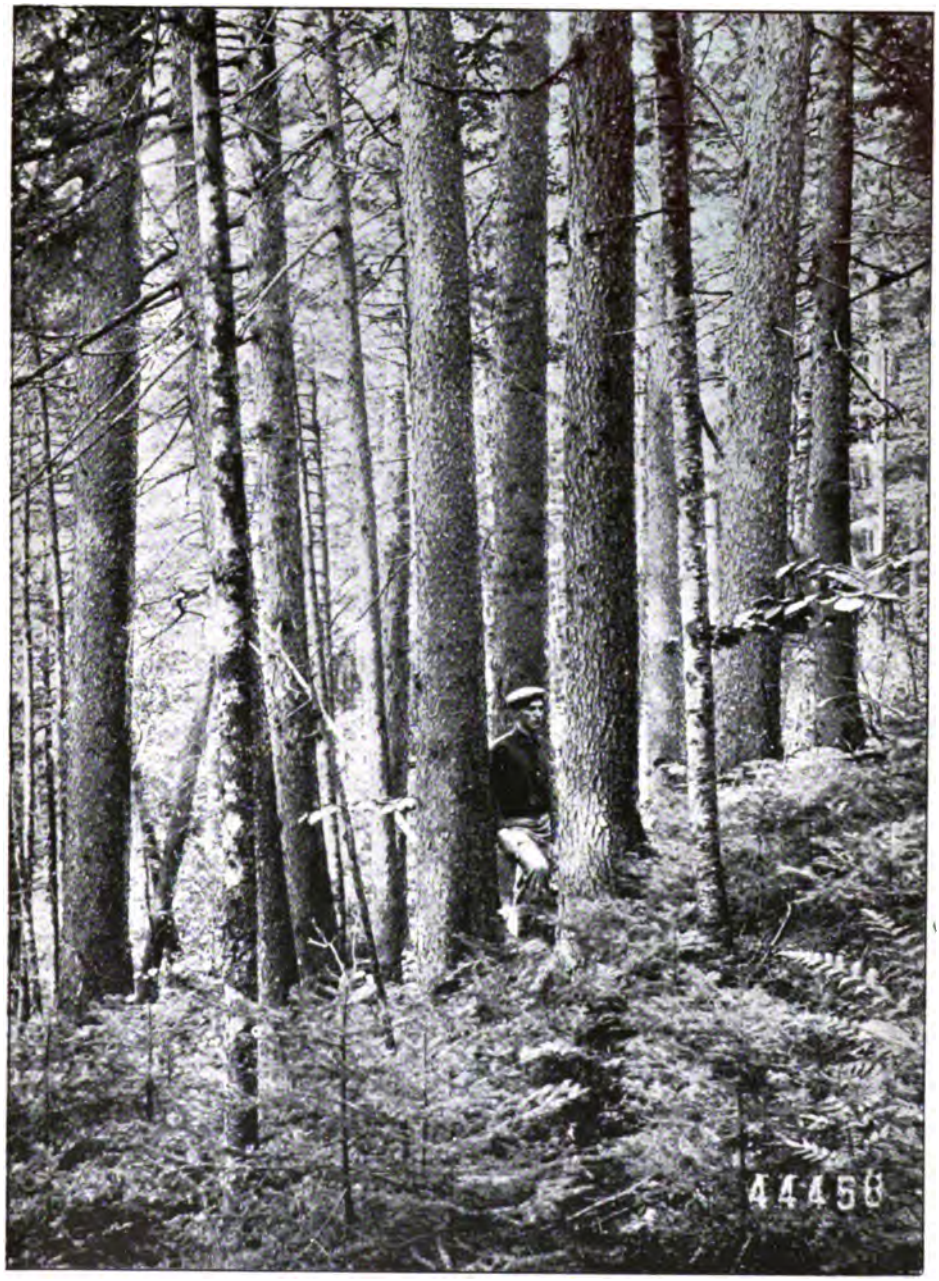
The evaporation and transpiration of moisture on forested areas is well known to be much less in temperate climates than from non-forested areas. The less that is returned to the air, the greater the amount left for the stream flow. The greatest value of the forest, however, is in decreasing the surface run-off, and thereby increas-

ing the seepage run-off, by which latter is meant that portion of the rainfall which enters the soil and reappears at lower levels in the form of springs. This checking of the surface run-off is due to the rapidity with which forest soils absorb the water as it falls, the ease with which it percolates downward, and the obstruction presented to quick flow over the surface by leaves, twigs, moss, etc., giving the water which does not at once enter the soil more time to penetrate as it moves slowly towards lower levels. A further advantage of forest cover in water conservation is the slowness with which the snow melts in the evergreen forest as compared with denuded hillsides, thus preventing disastrous floods in early spring by distributing the flow from the melting snow over weeks instead of days as is the case where it is exposed to the full glare of the sun and the sweep of warm winds. On the eastern slope of the Rocky mountains the forest cover has still another and very important function in checking the sweep of the dry Chinook winds, which evaporate the snow so quickly on exposed areas. It has been found that the rate of evaporation from snow surfaces under these conditions is at least several times as rapid as that from a water surface under similar circumstances. A snow fall of a foot or more in the depth may entirely disappear on these hillsides where the forest is wanting, in two or three days without even wetting the soil. To the various factors which have been mentioned as being of value in the forest in preventing the surface run-off and thereby increasing the seepage run-off should be added the decaying roots found in every forest which form canals for the downward percolation of the waters to the deeper soil layers, also the protection against frost in the soil provided by the even blanket of snow. This frequent absence of frost in forest soils enables much snow water to sink into the soil as it melts which would otherwise be forced to run off superficially.

The surface run-off or flood water is ever a danger and in large volume is ever a curse. The seepage run-off or spring water is, on the contrary, one of nature's choicest blessings. Having once entered the soil the seepage waters percolate slowly downward to reappear weeks or perhaps months afterward at lower levels in the form of pure spring water, which must ever be the ideal source of water for domestic use. The streamlets from the springs unite lower down the valleys to form the larger streams, which in their fall over cliffs give man his cheapest power. When the water reaches the plain it may be used again, this time to double, triple, or even quadruple the crops of the farmer by irrigation. Finally the residue passes to the rivers and gives man his cheapest highway for transportation. Truly a story of blessings is the story of the water from the forested mountains.

In most cases the first step towards the conversion of forest clad hillsides to denuded slopes with the corresponding conversion of the steady-flowing mountain stream to a torrent when the snow is melting or the rain falling and to a dry bed when there is neither melting snow nor falling rain, is lumbering.

Logging may be conducted so as to be ruinous to a forest or it may be merely injurious or it may be beneficial. It all depends on how it is done and what happens afterwards. Unfortunately a combination of destructive lumbering and its all but certainly following slash fires has proven so disastrous to North American forests that the popular mind has come to associate lumbering an necessarily an evil to the forest. As commonly practised it has been and is exceedingly detrimental to both future wood production and water conservation. In America the absence of a market for the debris left by the logger is much the greatest hinderance to ideal methods of forest management. It is fortunately not an insurmountable obstacle and in many cases the value of the forest product is already such as to bring a practical solution within reach and the inevitable advance in stumpage values will in the near future make it universally applicable. There is no reason why the white pine forests of Canada should not be logged so as to improve the condition of the stand by the removal of all mature and over-mature timber, and that without endangering the forest, for values are such that the government can well afford to pay twenty-five cents to burn the debris caused by cutting a thousand of logs which is worth from four to seven dollars on the stump.



No. 13—A fine stand of spruce, cutting about 25 M. ft. per acre, with a dense undergrowth of balsam. These spruce trees average over 200 years old. The soil is very shallow and rocky, wholly unfit for agriculture.

During the last year the debris from logging some twenty-five million feet cut in a Minnesota pinery has been successfully burned when conditions were favourable for a safe burning with all the care necessary to safeguard the seed trees left standing and the younger trees which were already on the ground, but which were not sufficiently mature to be removed. The cost of this brush burning was about fifteen cents per thousand of the timber cut. In some cases where the weather was too dry to do the burning as the logging proceeded, and it was on that account necessary to make a second operation of it, the cost was somewhat more, but in no case exceeded twenty-five cents per thousand. The lumberman who had charge of the brush burning told me that if he were open for an engagement he would be glad to take a contract to burn the brush in any Canadian pinery cutting eight thousand per acre at twenty-five cents per thousand. The most important feature of brush burning after lumbering is the safety it gives the forest from accidental burning later. A second and very great advantage is that a slight burning off of the moss and needles on the surface of the soil makes conditions very much more favourable for the pine seeds to make a 'catch,' as the farmers say of their clover. It has been repeatedly found that a very much more abundant catch of pine seedlings is to be found on areas having the surface burned over than where no fire has run. This is because the pine seed on germination has less difficulty in reaching mineral soil and thus coming in touch with permanent moisture. That the absence of tree tops and brush piles on the ground gives the seedlings a better chance to develop after they are once rooted is of course self evident. There are two features of this appearance of fire as a friend of the forest which will bear emphasizing. The utmost care must be taken to burn only when the soil itself is wet, that is, at a time when the burning may be controlled, and in the second place we should not forget that the operation is for the benefit of the future forest, hence the cost should be borne not by the lumberman whose interest is only temporary, but by the state which must look upon it as an investment which will return with large dividends when the crop which it saves or helps to reproduce will have become ready for the axe. It is of course self evident that the practicability of such a forestry measure for any given locality will depend on local conditions, more particularly on the value of the stumpage on the tract concerned.

While there are many instances in North American forests where fire has through accidentally favourable circumstances proven a friend to the forest, there are probably a hundred times as many cases on ten thousand times as many acres where it has proven a terrible foe. Although most of our forest fires follow the lumberman and are a direct result of the condition he brings about in the woods, they are by no means all chargeable to this account. There are in our northern coniferous forests vast areas which have been burned over where no lumberman has ever swung an axe. These fires are in most cases due to the carelessness of the Indians and to lightning, though not a few are to be attributed to the white man who has made his way through these forests as surveyor, explorer, hunter, or tourist.

Fire in the forest is alike the greatest enemy of wood production and water conservation. Light surface fires are not uncommon in pineries, especially in the South, which do no harm to the large timber but which destroy all small trees and seedlings, and by burning the litter on the surface of the ground do a temporary injury to the soil both as regards its fertility and water holding capacity. More severe fires frequently kill all the standing timber although it is exceptional for the large trees to be so completely destroyed as to be worthless for lumber if cut within a year. This, however, sometimes happens, the very trunks of the large trees being burned. Over much the larger part of our northern woodlands the soil contains a very large proportion of organic matter. Should the fire occur during a prolonged drought the soil itself may and often does burn clear to the rock beneath. Subsequent rains wash the ash and the remaining residue of mineral soil into the crevices or carry it quickly down the slopes leaving the rock bare.

The forest may quickly recover from the destruction of the undergrowth if the old trees still live, for a reseeding will presently follow. The destruction of the young

trees by the after lumbering fire may on the other hand mean the laying waste of the tract for a long time, for in the absence of seed trees of the desirable species the ground can only become occupied by weeds and such inferior trees as birch and poplar, which on account of the lightness of the seeds may be blown in from great distances. The destruction of the small trees and seedlings by such slash fires is indeed often the ruination of what was once a valuable forest so far as the future production of valuable timber is concerned. The destruction of the soil itself is of course much the greatest possible calamity, for not only does it remove for all time the possibility of restoring the forest but it brings about the most dangerous possible condition as regards stream flow. The rain falling on such a soil-burned area runs quickly downward bearing with it a full load of ash and silt. Streamlet unites with streamlet to form torrents in every gully. The torrents unite to form floods in the larger valleys. Reaching the level agricultural lands the floods spread out and slack the speed of their waters sufficiently to deposit the coarser gravel and sand as they flow onward seeking the shortest course to the ocean. Could any contrast be greater than that of a mountain stream before and after the destruction of the forest by fire. In the first case we have the spring streams flowing perennially from that unsurpassed reservoir, the forest soil, with its blessing of pure water, and steady flow for domestic use, for power, for irrigation, and for navigation. The forest destroyed, the streams become torrents during rains which rushing valleyward loaded with silt and debris from the steeper slopes, may become agents of destruction or irresistible power. This destructive power is shown by the carrying away of bridges, homes, and even whole villages; in the silting over of the agricultural lands of the valleys often making them entirely worthless, and in the filling up of the river and harbour channels by the deposit, as the flood finally slows down, of the finer particles of their soil load robbed from the mountain side.

Just a little over a century ago, the French people under the influence and misapplication of Adam Smith's teachings regarding ownership of property, divided up much forest property which had been formerly held by the state. As private owners are always prone to do, the new proprietors proceeded to lumber their little holdings. This lumbering with its following fires destroyed the forest of about a millions acres in twenty mountain compartments in the Alps, Cevennes, and Pyrenees. The denudation of the million acres caused the destruction of some eight million acres of once fertile soil in the valleys by erosion and silting, whole communities becoming impoverished. The French government has since spent $20,000,000 in reforesting the denuded mountain slopes, but so great has the injury been from the erosion of the soil that it is estimated that $30,000,000 more will be required to complete the task.

FOREST OWNERSHIP.

From what has already been said of the functions of the forest it will be evident that the state which has in its care the interest of all the people and of future generations as well as present populations is logically the only rightful owner of large areas of non-agricultural lands. Private ownership always means utilization for private advantage. In the great majority of cases the only interest the private owner has is that of financial profit and in most cases it is desired that the returns be realized at an early day. Even when private forest properties are managed conservatively there is in America practically no guarantee that should the property pass to heirs or the personnel of the ownership change in other ways that the conservative policy would be continued. This, however, is not the most important feature. Private ownership, meaning as it does, that private and local interests only will be consulted in matters of policy, it follows that a forest which may be of the utmost importance in conserving the water supply of a city, or of an area requiring water for irrigation, or some power plant, may nevertheless be exploited as the immediate interest of the private owner dictates wholly without regard to the injury inflicted on industries at lower

points in the drainage area by the disturbances of the water stages, or the destruction that may be wrought by floods as a direct result of the denudation of the hillsides. The same line of reasoning applies to climate. What possible interest has a capitalist residing in Toronto or New York in maintaining a favourably humid atmosphere in New Ontario or British Columbia? In this connection might also be mentioned the value of the forest as a playground, as such it is admittedly unexcelled. In private hands, however, it is all too common, that the area is fenced about and warning notices by the score posted to warn the seeker after health and recreation that 'trespassers will be prosecuted.'

The time element in the maturing of a forest crop is an exceeding great barrier to private forest management. There is no line of business in which men ordinarily engage which requires the looking forward for more than a decade or at least two decades. Wood growing, however, requires the constant planning in advance for 60, 80, 100, and even more than 100 years. So great indeed is this influence of the long time element on the business of wood growing that the great law of supply and demand is paralyzed. To illustrate: If the demand for wheat increases in relation to the available supply, the price rises, the farmers sow a larger acreage and presently the increased demand has resulted in an increased supply. The same is true of practically every commodity which may be reproduced or even mined, except wood. The demand for wood has steadily risen during the last century. The prices notwithstanding large natural supplies have steadily risen, and during the last decade as exhaustion of supplies is seen in the distance have very rapidly risen. This rise in price has not yet resulted in an increased production of wood nor will it—judging from the history of nations—ever appreciably increase the production until the evils of a wood famine have been long felt. On the contrary, although increased demand means increased prices, increased prices means increased *harvesting*. Increased harvesting means in North America that larger areas be cut over and cut more closely. This on account of the greater amount of debris leaves the forest in much worse condition for the all but inevitable fire, and as a net result of the greater demand under private ownership we have *decreased* production.

The fire problem is essentially an educational problem. The stringent regulations which are not only desirable but absolutely necessary for the safety of the forest must be uniform on adjoining areas and must be at least moderately uniformly enforced. Ideal regulations for the protection of the forest from fire strictly enforced here and there by a few wise owners would lead to resentment and very probably reprisals on the part of the careless, while the same regulations enforced uniformly throughout the country by the government would be respected and presently lead to a much more intelligent appreciation on the part of the public of the importance of protecting the forest from fire. The fact, too, that the influence of a fire on an area is by no means confined to that area (as shown by the relation of forest and stream flow), but may be of the utmost importance a hundred miles from the point when the fire actually occurred gives the question of fire protection a distinctly public relation.

Perhaps not the least of the reasons why the fee simple of forest lands should be retained by the state is the fact that the profits of holding naturally grown timber lands are very largely—almost wholly—due to the development of the country (a national condition) and to the approaching exhaustion of the more valuable timber forests of the world (an international condition) and are thus the property of the whole people, and as such are more equitably employed in reducing taxation than in swelling the private fortunes of speculators. The profits in holding lands for a rise in stumpage have in recent years been very great. There are probably few present who do not know of particular instances of forest lands having doubled, trebled and even quadrupled in value during the last ten years. This increase in the value of stumpage is not alone due to the increase in demand for wood products, but to the ending of the long period of the giving away of timber lands which has been so recklessly practised alike by the various states and by the United States national government, and the dawning of a day when the great bulk of the available timber supplies in the United States are in the

hands of strong financial interests which can afford to await the cleaning out of the supplies which remain in less far sighted hands. The 'unearned increment,' as Henry George would call it, will yield a bountiful harvest for those who have been wise enough to provide themselves with large supplies. In Canada we must thank our fathers for the wisdom shown in keeping this most valuable natural asset for the whole people. It is our duty to conserve it by wise utilization and transmit it unimpaired to the generations who follow us.

CANADIAN FOREST RESOURCES.

The forest resources of Canada are very great. Just how great no one at present can know, for vast areas known to be forested are as yet quite unexplored. It would, of course, be a fatal error to assume that they are inexhaustible. Twenty years ago the white pine in Michigan was regarded as inexhaustible. To-day six million acres which thirty years ago carried the finest white pine forest in the world have been abandoned by their owners for taxes and lie almost wholly waste, a man-made desert, the combined result of a reckless use of the axe and a still more reckless use of fire. While it is very improbable that any considerable body of men hold that the forests of Canada are inexhaustible, I believe that not a few over-estimate the national forest wealth. True, we have some hundreds of millions of acres of forest lands. Lands which on account of their non-agricultural character must, or at least should, always remain under forest cover. Such an area is almost beyond human comprehension. So, too, I fear is the destruction of the forest by fire in this northern vastness. I have read with some care the stories told by explorers, surveyors and trappers and all tell a tale of forest destruction by fire during the last twenty or thirty years, which, if the total could be brought together, would stagger belief. I have myself made a somewhat extended trip beyond the height of land in northern Ontario, and during the three weeks' travel I did not see a square mile of forest which did not show traces of having suffered by one or more fires during the last 150 years. A section of Banksian pine, cut near Mattagami, on the western border of the Temagami forest reserve, showed positive evidence of having suffered from severe fire four times within the last 66 years, at intervals of 9, 13 and 42 years respectively. The lesson from what we do know regarding the occurrence of fire in the far north is a double one, viz., that we must at the earliest possible moment reach the Indians in that country and do whatever may be done to educate them to use greater care in the use of fire, and that in the meantime we must not bank on forest resources proportionate to forest area until we know more about this portion of our asset by examination at first hand.

Should, however, the injury and destruction of the northern forests be quite as great as I fear, we have still without the shadow of a doubt an asset in our woodlands which if conserved by wise use will make Canada one of the richest of the nations. In considering the future of our forests it is of the utmost importance to note that we have for our nearest and most accessible neighbour a nation which now consumes more than half the sawn lumber produced in the world. This nation is also growing several times more rapidly than any other civilized country. It has before it still greater possibilities of wealth and growth in population. The Mississippi valley is undoubtedly the richest valley in the world and will by the time another crop of trees is grown contain fully 100,000,000 population. The forests of the United States are being decimated more rapidly than was ever before witnessed in the history of the world. The most optimistic predictions state that the present supplies can scarcely meet the present demand for more than sixty years. But the consumption of wood increased *ten fold* during the last sixty years. What must be the situation if it should increase five, three or even two fold during the next sixty years? Beyond a doubt a revolution with regard to our conventional ideas of the value of stumpage lies before us. It has indeed already begun and events are moving swiftly.

But while we in Canada should take a careful survey of the broader field of the world's markets that we may intelligently hold or dispose of our surplus stocks, the

insuring of an adequate supply of timber for the development of the resources of our own country is of the greatest importance to us. We are on the threshold of a great national development. Presently millions of people will be seeking homes in the comparatively treeless plains of the west, and aside from the character of the population of the future, nothing will contribute more largely to our national advancement than an abundant supply of timber.

In the past our forest management, with the exception of somewhat better protection from fire and in the retaining of the fee simple of the land in the state, has not differed materially from the forest management that has devastated the forests of the United States, and which has begun the story of the man-made desert in our own north country. Recently a tremendous step in advance was taken in the adoption of the policy of placing the non-agricultural lands in permanent forest reserves. The next and only logical step will be to train men in practical forest management that the forests on these lands may be handled so as to yield the largest possible revenue in perpetuity.

The possibilities of revenue from our vast heritage are very great. I have on other occasions committed myself to figures on this proposition, which I consider to be very conservative. I will content myself to-night by saying that there is no reason why under a system of rational forest management, the present revenue from Canadian forest lands should not be increased manyfold, *not only without injury,* but *with actual benefit to the forest.*

THE CONSERVATION OF NATIONAL RESOURCES.

Nothing can be more important than that the natural resources of a country be conserved intact. War, folly, or unrighteousness may result in the destruction of accumulated wealth, in the degradation or decimation of populations, but if the natural resources of the country be unimpaired, rehabilitation will be but a matter of time. On the other hand, the destruction of the natural resources is striking at the very foundations of prosperity, and sooner or later will transform the richest lands to poverty. To illustrate: Egypt has during the past ten thousand years been repeatedly devastated of her accumulated wealth, but is again to-day entering upon what promises to be the most prosperous period of her long and checkered career. She is fully recovering, or at least *may* fully recover from all kinds of former loss because her one natural resource—*water for irrigation*—has remained intact. Germany—for centuries the battle-field of Europe—has in recent years become more populous and more prosperous than during any other period of her history, notwithstanding repeated destruction of property and decimation of population in former times, for the natural resources of the country remained practically intact.

On the other hand, we may have many melancholy examples of the destruction of the natural resources. Mesopotamia, once famed as the most fertile country in the world, in which Herodotus said that the grape could not be grown because of the excessive humidity of the climate, is now a weary waste of sand and rock incapable of supporting one man in poverty where it once supported a hundred in comfort. Palestine, once a land flowing with milk and honey, Sicily, for a long time the granary of the Roman empire, and Greece, are also excellent examples of countries which were once the home of a teeming and prosperous population, but which with the destruction of their forests by reckless lumbering and fire have become the prey to erosion by wind and water, and are to-day mere shadows of their former glory, without hope of ever materially bettering their conditions. *They have destroyed their soil and water,* and generations yet unborn must reap the fruits of an ancient folly.

But we do not need to go as far afield to find the *man-made desert.* There are tens of thousands of acres of it in the state of New York, in Pennsylvania, in Michigan, in New England, in California. But to come still nearer home, there are tens of thousands of acres of it in British Columbia, in Quebec and in my own province

of Ontario, particularly in the Muskoka region and along the line of the Canadian Pacific Railway. *But it is yet early in the day.* Canada is *yet* in a position to be free from the curses of posterity in this regard. The wisdom of her management of her forest lands in the next half century will determine for ages whether *she was* or *was not* a worthy custodian of an almost unbounded wealth.

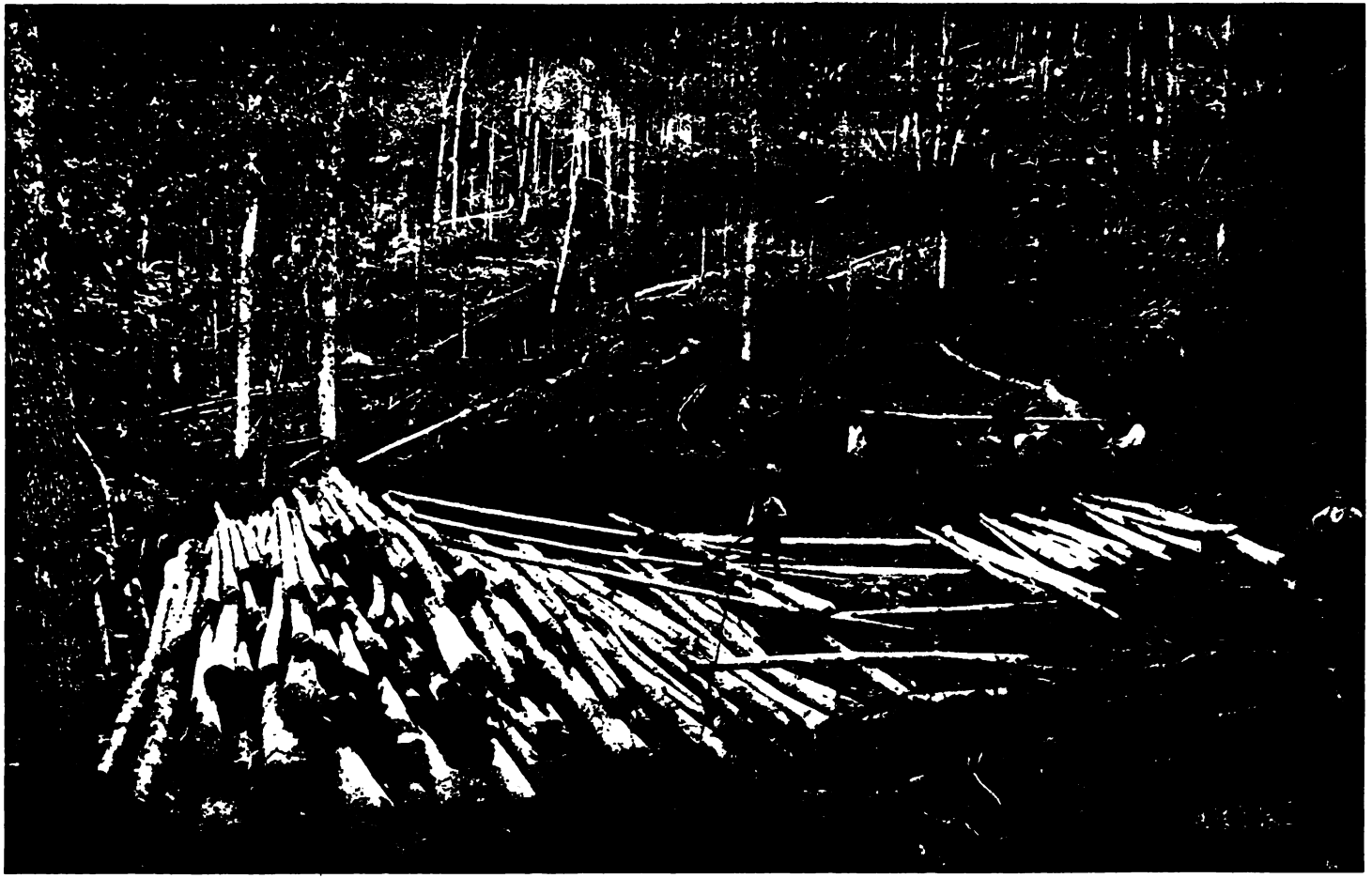
(The illustrations Nos. 1 to 14 in this report were supplied by kindness of Dr. Clark to illustrate his lecture. Owing to a misunderstanding the plates were made full size and had to be distributed through the report.)

TREASURER'S REPORT.

1904.

NORMAN M. ROSS, Treasurer, in account with the Canadian Forestry Association.

Receipts.	$ cts.	Expenditures.	$ cts.
1904.			
Balance from 1903	723 16	Rod and Gun Publishing Co.	420 00
Membership fees	503 16	Printing and stationery	160 51
Grant from province of Ontario	300 00	Travelling expenses	162 45
Grant from province of Quebec	200 00	Salaries	152 00
Grant from province of B. C	100 00	Wreaths	27 00
Interest	20 45	Advertising	4 48
		Commissions on cheques	2 50
		Express and telegrams	1 72
		Balance	916 11
Total	1846 77	Total	1846 77



No. 14.—The cutting of miniature timber, greatly to the detriment of the forest and the ultimate financial loss of the owner. The private owner is prone to cut too early. Early cutting may, however, be made necessary by failure on the part of the State to adequately protect woodlands from fire or by the imposition of unjust taxation.

MEMBERS OF THE CANADIAN FORESTRY ASSOCIATION.

Ami, H. M., M.A., D.Sc., F.G.S., F.G.S.A.	Ottawa, Ont.
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Aylsworth, W. R.	Belleville, Ont.
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Alexander, P.	Regina, Assa.
Aylmer, Hon. F. W., C.E., P.L.S.	Golden. B.C.
Atkinson, W. F. V.	1 Des Grisons St., Quebec, P.Q.
Allen, H. S.	Cardston, Alta.
Angus, R. B.	Montreal.
Angus, A. F.	Manager Bank of Montreal, Regina.
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Adams, Geo.	New Westminster, B.C.
Arbuckle, Jas. T.	Crystal City, Man.
Addison, W. H. F.	80 Cumberland Street, Toronto, Ont.
Agnew, Hon. J. H.	Provincial Treasurer, Winnipeg, Man.
Butler, M. J.	457 Laurier Ave., Ottawa.
Bell, Robt. B.A.Sc., M.D., LL.D., F.R.S., F.R.S.C., F.G.S., F.G.S.A.	Geological Survey, Ottawa, Ont.
Bostock, Hon. Hewitt.	Monte Creek, B.C.
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Boyd, M. M.	Boycaygeon, Ont.
Bell, Jas. A.	St. Thomas, Ont.
Benjamin, S. P.	Wolfville, N.S.
Bryce, Rev. Geo., M.A., LL.D.	Colony Street, Winnipeg, Man.
Baird, Thos.	Crystal City, Man.
Brown, Alex.	Glenora, Man.
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Beaupré, Arthur P.	842 St. Catherine Street, Montreal, P.Q.
Barnhill, B. B.	Two Rivers, Cumberland County, N.S.
Boyce, H. F.	Qu'Appelle Station, Sask.
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Beazer, Mark.	Beazer, Alta.
Burn, Geo.	General Manager Bank of Ottawa, Ottawa, Ont.
Burland, Lt.-Col. Jeffrey H.	Montreal, P.Q.
Bagge, Richard.	Quebec, P.Q.
Baillarge, Chevalier Chas.	72 St. Louis St., Quebec, P.Q.
Bryant, Edward S.	56 Plympton St., Cahbridge, Mass., U.S.A.
Brownlee, W. H.	Crystal City, Man.
Bickerdike, R., M.P.	Montreal, P.Q.
Browne, J. C.	Ottawa, Ont.
Bradley, R. R.	Biltmore, N.C., U.S.A.
Booth, J. R.	Ottawa, Ont.
Buck, F. E.	108 Stanley St., Montreal, P.Q.
Bigger, E. B.	Pulp and Paper Magazine, 18 Court St. Toronto, Ont.
Brown, H.	Secretary-Treasurer, Montreal Lumber Co., Montreal, P.Q.
Byrd, Chas.	Munderloh & Co., Montreal, P.Q.
Boyd, W. T. C.	Bobcaygeon, Ont.
Bronson, Hon. E. H.	Ottawa.
Bronson, W. G.	Ottawa.
Blackburn, R.	Ottawa.
Brown, O. B.	Berlin, N.H., U.S.A.
Bennett, R. R.	Box 95, Calgary, Alta.
Brodie, R.	Victoria Ave. P. O., Westmount, P.Q.
Burgess, R. K.	43 Adelaide St. East, Toronto, Ont.
Bray, Samuel.	Dept. Indian Affairs, Ottawa.
Belton, M. M.	President Anglo-Newfoundland Co., 87 Water St. St. John's, Newfoundland.
Buller, Prof. A. H. Reginald.	Botanical Dept., University of Manitoba, Winnipeg, Man.
Buck, F. P.	Sherbrooke, P.Q.

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Creighton, Graham, Education Office.. .. Halifax, N.S.
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Cowan, Wm.. .. Prince Albert, Sask.
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Carpenter, H. S., Trent Canal Office.. .. Gamebridge, Ont.
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Chipman, Willis, B.A.Sc., C.E.. .. Toronto, Ont.
Comstock, Prof. F. M., Ph. D., Care School of Applied Science.. .. Cleveland, Ohio.
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Coltart, Ian.. .. Beulah, Man.
Cassels, Hamilton, 19 Wellington St. West.. .. Toronto, Ont.
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Cowie, F. W., Public Works Department.. .. .. Ottawa, Ont.
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Curry, N.. .. Amherst, N.S.
Cormier, N. E., Supt. Forest Protection Service. Aylmer, P.Q.
Cummings, J. G.. .. Fort Steele, B.C.
Commerce, Manager of the Bank of.. .. .. .. Barrie, Ont.
" " " .. .. Belleville, Ont.
" " " .. .. Collingwood, Ont.
" " " .. .. Wiarton, Ont.
" " " .. .. Peterborough, Ont.
" " " .. .. Sault Ste. Marie, Ont.
" " " .. .. Cranbrook, B.C.
" " " .. .. Vancouver, B.C.
" " " .. .. Victoria, B.C.
" " " .. .. Waterloo, Ont.
Carsley, S., 507 Guy Street.. .. .. Montreal, P.Q.
Charlton, John.. .. .. Lynedoch, Ont.
Cooper, John A., Editor, Canadian Magazine .. Toronto, Ont.
Carlin, Mr., General Manager, Columbia River Lumber Company.. .. .. Golden, B.C.
Cochrane, Jas. A.. .. .. Edgefield, Hillhurst, P.Q.
Calhoun, T. B.. .. .. Calhoun's Mills, N.B.
Cudmore, R.. .. .. Crystal City, Man.
Craig, Arthur.. .. .. Clearwater, Man.
Chisholm, Hugh J.. .. .. 30 Broad Street, New York, N.Y., U.S.A.
Campkin, H. H.. .. .. Indian Head, Assa.
Cook, R. S.. .. .. Prince Albert, Sask.
Crannell, L.. .. .. Ottawa.
Clark, Dr. Judson F.. .. .. 164 Davenport Road. Toronto, Ont.
Chisholm, Hon. Wm.. .. .. P. O. Box 585, Halifax, N.S.
Caulfield, Francis W.. .. .. Manager Lloyd's Bank, 16 St. James St., London S.W., England.
Colloredo-Mannsfeld, Prince.. .. .. Dobrisch, Bohemia, Austria.
Cudmore, A. E.. .. .. Crystal City, Man.
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Connolly, Robt.. .. .. Great Salmon River, St. John Co., N.B.
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Davis, Hon. E. J.. .. .. Toronto, Ont.
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Fraser, J. B., 74 Nepean St.. .. .. Ottawa, Ont.
Fisher, Elizabeth, 1502 Pine St.. .. .. Philadelphia, Pa.
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Forman, John, P.O. Box 427.. .. .. Montreal, P.Q.
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Greig, Geo. H.. .. .. Winnipeg, Man.
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Goulter, H. H.. .. .. Virden, Man.
Gardner, Jas., 311 Stanley Ave.. .. .. Montreal P.Q.
Gorman, Robt., 282 Somerset St.. .. .. Ottawa, Ont.
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Johnson, Geo., Dominion Statistician.. .. .. .. Ottawa, Ont.
James, S., 227 George St.. .. .. Toronto, Ont.
James, Walter J. T.. .. .. Rosser, Man.
James, D. D., 227 George St.. .. .. Toronto, Ont.
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Keyes, P. G., Secretary, Dept of Interior.. .. .. Ottawa, Ont.
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Lowden, John, 40 Church Street.. .. .. Toronto, Ont.
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Leslie, W. S.. .. .. 30 Somerville Ave., Montreal, P.Q.
Leake, Albert H.. .. .. 115 Delaware Street, Toronto, Ont.
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McDonald, D. J.. .. .. Kamloops, B.C.
McInnes, W.. .. .. Geological Survey, Ottawa, Ont.
McLean, J. K., D.L.S.. .. .. 119 McLeod St., Ottawa, Ont.
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McLaren, Thos.. .. .. Pipestone, Man.
McCarthy, Chas.. .. .. Cardston, Alta.
MacKay, Hector H., M.D.. .. .. P. O. Box 27, New Glasgow, N.S.
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MacKay, Hon. Robert.. .. .. Royal Building, Place d'Armes, Montreal, P.Q.
Macaulev, T. B.. .. .. 4007 Dorchester St., Westmount, P.Q.
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Nixon, Robert.. .. .. Crystal City, Man.
Nicolle, Fred. R., B.A.. .. .. 41 Union St. W., Kingston, Ont.
Normal School, Provincial.. .. .. Truro, N.S.
Nicholson, E. M.. .. .. Room 206, Board of Trade, Montreal, P.Q.
O'Hara, B. L.. .. .. Levis, P.Q.
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Ogilvie, R. M.. Surveys Branch, Dept. Indian Affairs.. .. .. Ottawa, Ont.
Owens, Hon. Wm.. .. .. 4020 Dorchester St., Montreal, P.Q.
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Perley, Geo. H., 193 Sparks St.. .. .. Ottawa, Ont.
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Peart, H. S.. .. .. Ontario Agricultural College, Guelph, Ont.
Pyper, Wm.. .. .. Crystal City, Man.
Patterson, Jno. D.. .. .. P. O. Box 3, Woodstock, Ont.
Pugh, H. J.. .. .. Virden, Man.
Pugsley, J. Newton.. .. .. River Hebert, Cumberland, N.S.
Pettit, Morley.. .. .. Belmont, Ont.
Peters, Thos. A.. .. .. Dept. of Agriculture, Fredericton, N.B.
Ponpius, Gabriel.. .. .. 376 Maclaren Street, Ottawa, Ont.
Power, W. Gerard.. .. .. St. Pacome, P.Q.
Patterson, J. E. J.. .. .. Salisbury, N.B.
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Ricardo, W. Granby, Coldstream Ranch.. .. .. Vernon, B.C.
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Roche, John D., 665 City Hall Ave.. .. .. Montreal, P.Q.
Ross, Norman M., B.S.A., Dept. of Interior.. .. .. .. Ottawa, Ont.
Rutherford, Wm., 85 Atwater Ave.. .. .. Montreal, P.Q.
Robertson, Jas.. .. .. Glencoe, Ont.
Reilly, P. T.. .. .. Winnipeg, Man.
Ring, John J.. .. .. Crystal City, Man.
Ring, Robert.. .. .. Crystal City, Man.
Rothnie, Jas.. .. .. Virden, Man.
Russell, A. L., D.L.S.. .. .. Port Arthur, Ont.
Rutherford, Andrew, 85 Atwater Ave.. .. .. Montreal, P.Q.
Rorke, Louis V.. .. .. Sudbury, Ont.

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Reynolds, Professor J. B.	Ontario Agricultural College, Guelph, Ont.
Robinson, T. M.	Box 186 Gravenhurst, Ont.
Richards, Jas. W.	Bideford, P. E. Island.
Robinson, Miss Marion.	Forestry Branch, Interior Dept., Ottawa, Ont.
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Stephens, G. W., jr.	18 St. Alexis St., Montreal, P.Q.
Stewart, Wm. Chas. E.	Savings Bank Branch, Post Office Department, Ottawa, Ont.
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Stairs, E. Geoffrey.	P. O. Box 2207, Montreal, P.Q.
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Van Nostrand, G. J.. .. .. Room 405, Temple Building, Toronto, Ont.
Van Nostrand, A. J.. .. .. Room 405, Temple Building, Toronto, Ont.
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Williamson, Wm., Room No. 8, 30 St. John St... Montreal, P.Q.
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Weir, Douglas, 94 Ste. Famille St.. .. .. Montreal, P.Q.
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Zavitz, E. J., B.A.	Ontario Agricultural College, Guelph, Ont.

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